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FM 6-38

DEPARTMENT OF THE ARMY FIELD MANUAL

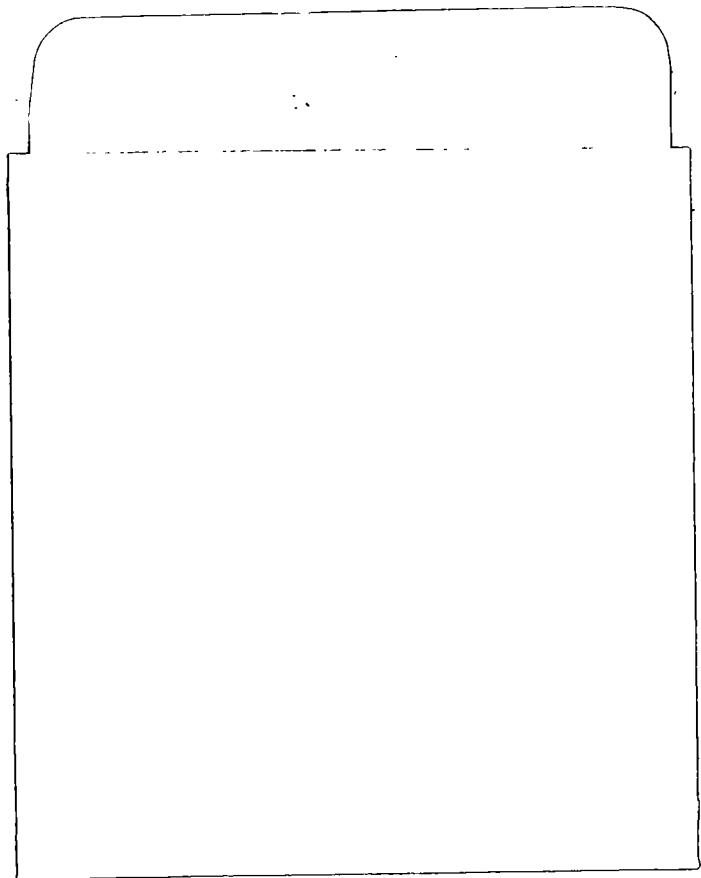
**FIELD ARTILLERY
BATTERY
SERGEANT**

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HEADQUARTERS, DEPARTMENT OF THE ARMY

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FIELD MANUAL

No. 6-38

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 29 January 1970

FIELD ARTILLERY BATTERY, SERGEANT

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*This manual supersedes FM 6-38, 4 April 1966.



CHAPTER 1

GENERAL

1. Purpose and Scope

a. This manual is a guide to assist commanders in training the personnel of a Sergeant firing battery to become an efficient, smooth-working, disciplined team that will function effectively in combat. This manual prescribes the duties of personnel, section drills, methods of inspection and maintenance, methods of decontamination and destruction, safety precautions, training, and tests for qualification of missilemen.

b. The material presented herein is in agreement with International Standardization Agreements STANAG 2103, Reporting Nuclear Detonations, Radioactive Fallout, and Biological and Chemical Attacks; STANAG 2113, Destruction of Military Technical Equipment; and STANAG 2314, Organization and Doctrine for Explosive Ordnance Disposal Operations; and is applicable without modification to both nuclear and nonnuclear warfare.

c. Drills prescribed in this manual cover the duties of individuals in emplacement, testing, assembly, disassembly, and march order. In case of conflict between procedures outlined herein and those prescribed in the appropriate technical manuals, the procedures prescribed in the technical manuals will be followed.

d. Tables 1 through 6 are at the back of the manual. Table 1 describes command holds, tables 2 through 5 list duties of personnel during emplacement, assembly, disassembly, and march order, and table 6 is a nomograph for determining the effective rocket motor temperature.

e. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded directly to the Commandant, U.S. Army Field Artillery School, ATTN: AKPSIAS-PL-FM, Fort Sill, Oklahoma 73503.

2. Definitions of Terms

a. *Azimuth Orientation System (AOS)*—An integrated group of components that includes the azimuth orientation unit (AOU), the reference theodolite (RT), the traverse target (TT), and the tools and spares group.

b. *Couple*—To attach the lunette or kingpin of a trailer or semitrailer to the pintle or the fifth wheel of a prime mover, connect all brake and light cables, and retract the landing gear.

c. *Firing Set (FS)*—The component that initiates and monitors the signals necessary to control the countdown and to condition and fire the missile. The firing set is on the front of the launching station and consists of an enclosure, electronic assemblies, and associated cabling.

d. *Gas Turbine Generator Set (GTGS)*—A generator set that is powered by a gas turbine. A gas turbine generator set is mounted on the launching station, on the organizational maintenance test station, and on 1½-ton trailers to provide necessary electrical power for operations. The gas turbine generator sets are interchangeable.

e. *Launching Station (LS)*—A semitrailer consisting of four major components—the zero length launcher, the azimuth orientation system, a gas turbine generator set, and the firing set. The launching station is used to assemble, prepare, and fire the missile.

f. *Organizational Maintenance Test Station (OMTS)*—A specially designed van trailer used to perform preassembly tests on the missile sections. Spare parts for the OMTS and the missile are stored and transported in the trailer.

g. *Orientation*—

(1) *Front*—The end of any trailer- or semitrailer-mounted equipment that is coupled to the prime mover. The front of a missile in the horizontal position is the end of the missile in the direction in which the missile points.

(2) *Right (left)*—The direction to the right (left) of a person who is standing at the rear of, and facing, the equipment.

h. Sergeant Missile—The assembled missile, which consists of the following:

- (1) A warhead section.
- (2) A guidance section.
- (3) A rocket motor section.
- (4) Four control surface assemblies.

i. Transporters—

(1) *Motor guidance transport trailer (MGTT)*—A specially designed semitrailer used to transport the missile guidance section, the rocket motor section, and the four control surface assemblies.

(2) *Warhead section transporter*—A modified general purpose 2½-ton cargo truck equipped to transport a warhead section in its container.

j. Uncouple—To detach the lunette or kingpin of a trailer or semitrailer from the pintle or the fifth wheel of a prime mover, disconnect all brake and light cables, and extend the landing gear.

3. References

References pertaining to the Sergeant missile and associated equipment and covering related matters not discussed in detail in this manual are listed in the appendix.

CHAPTER 2

ORGANIZATION

4. Composition of the Sergeant Firing Battery

The firing battery (fig. 1) consists of a battery headquarters, a battery detail, and a firing platoon.

a. Battery Headquarters. The battery headquarters is responsible for administration, mess, supply and nonmissile maintenance within the firing battery. Its responsibilities are comparable to those of similar units.

b. Battery Detail. The battery detail consists of a detail headquarters, a communication section, and a survey section.

(1) *Detail headquarters.* The detail head-

quarters consists of the detail commander and the chief of detail.

(2) *Communication section.* The communication section is responsible for wire and radio communication for the battery.

(3) *Survey section.* The survey section provides the necessary survey control at the firing positions of the battery.

c. Firing Platoon. The firing platoon consists of a platoon headquarters, a firing section, a missile test section, and an ammunition section.

(1) *Platoon headquarters.* The functions of the firing platoon headquarters are to—

(a) Conduct training and insure proficiency of personnel.

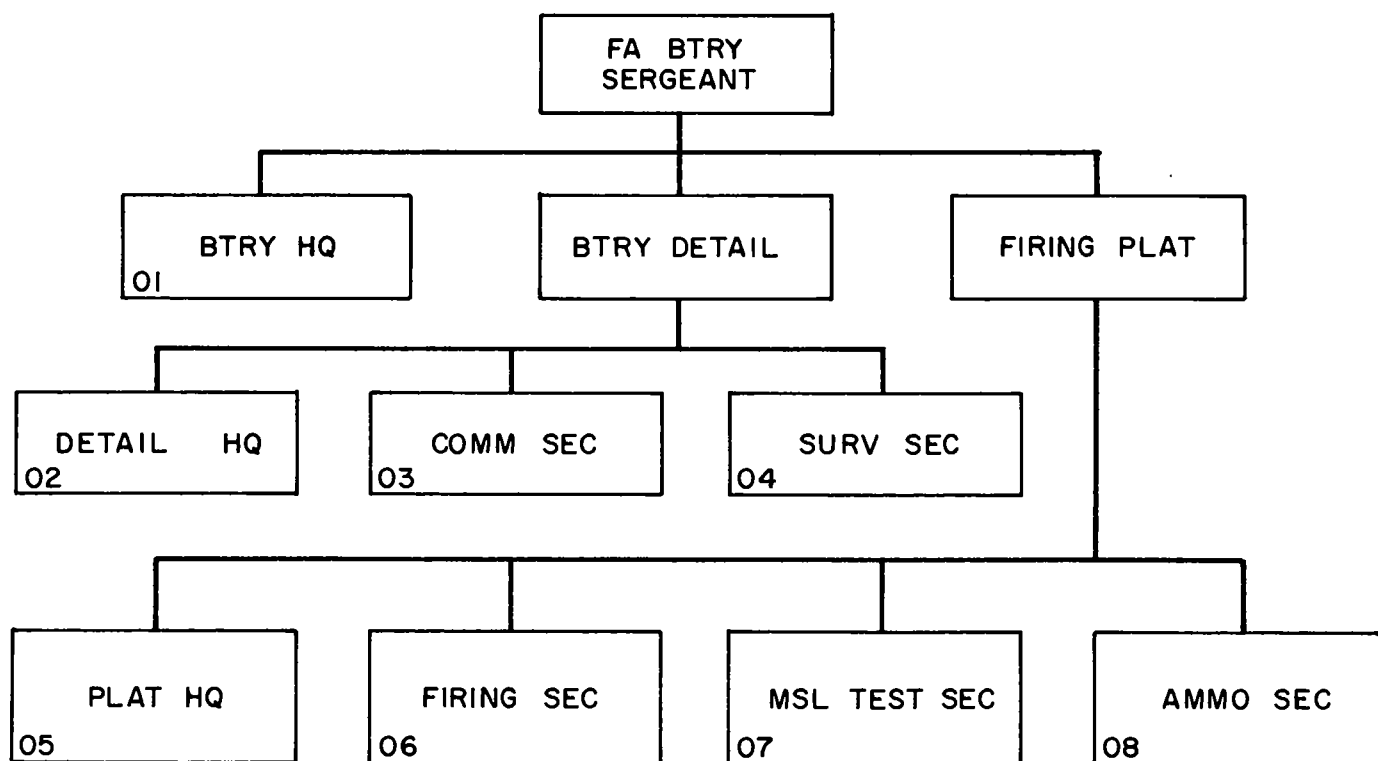


Figure 1. Field artillery battery, Sergeant.

(b) Perform duties in section drill, emplacement and march order, preparation for action and traveling, firing, missile assembly and disassembly, and inspection and maintenance of all platoon equipment.

(c) Insure security of warhead sections and missiles transported by the ammunition section.

(d) Insure observance of particular safety precautions (including Permissive Action Link (PAL) requirements) associated with the Sergeant missile and warhead.

(e) Prepare field fortifications for protection of personnel and equipment.

(f) Maintain records of the missile and support equipment as specified in appropriate technical manuals.

(g) Operate communication networks within the firing platoon.

(h) Assist in the selection of the firing positions.

(2) *Firing section.* The functions of the firing section are to prepare the firing position, emplace the launching station, assemble the missile, conduct the self-test of the firing set, insert the firing data into the firing set, orient the missile, monitor the automatic countdown, and perform the organizational maintenance of the launching station.

(3) *Missile test section.* The functions of the missile test section are to emplace and operate the organizational maintenance test station (OMTS), test the guidance section and control surface assemblies, perform organizational electronic maintenance on the missile, and perform organizational maintenance on the organizational maintenance test station.

(4) *Ammunition section.* The functions of the ammunition section are to draw (if directed by battalion), transport, and store the missiles and to perform organizational nonelectronic maintenance on missiles, missile transport equipment, and containers.

5. Duties of the Firing Platoon Personnel

The duties of the personnel in the battery headquarters and battery detail are comparable to those of personnel in similar positions in other field artillery batteries. Since the duties of such personnel are described in detail in AR 600-20, AR 611-201, FM 6-20-2, FM 6-140, and other appropriate field manuals and technical manuals, they are not discussed in this manual. The duties

of the firing platoon personnel are discussed in *a* through *d* below.

a. Platoon Headquarters Personnel.

(1) *Platoon commander.* The firing platoon commander has the same inherent responsibilities as the commanders of other field artillery firing platoons. He must give particular attention to maintenance, training, and security due to the complexity of the equipment within the platoon.

(2) *Missile assembly technician.* The missile assembly technician coordinates the technical operations of the three sections of the platoon and monitors the missile and support equipment records. He monitors the maintenance performed by the crew and coordinates this maintenance with the direct support unit. He must also be qualified to act as the platoon commander.

(3) *Platoon sergeant.* The platoon sergeant is the noncommissioned officer in charge of the firing platoon. He coordinates platoon operations and assists the platoon commander in performing his duties.

b. Firing Section Personnel.

(1) *Chief of the firing section.* The chief of the firing section is responsible to the platoon commander for—

(a) The training and efficiency of firing section personnel.

(b) The performance of duties in section drill, emplacement and march order, preparation for action and traveling, firing, missile assembly and disassembly, and inspection and maintenance of all section equipment.

(c) The maintenance of missile and support equipment records as specified in appropriate technical manuals.

(d) The observance of safety precautions and the decontamination of equipment and materiel within the section.

(e) Local security and the preparation of field fortifications for protection of personnel and equipment.

(f) Camouflage training; security training; and training in chemical, biological, and radiological (CBR) defense.

(2) *Assistant chief of the firing section.* The assistant chief of the firing section assists the chief of the firing section in performing the duties described in (1) above. His specific duties pertain to supervision of assembly and disassembly of the missile. He performs other duties as directed by the chief of the firing section.

(3) *Boom operator.* The boom operator oper-

ates the launching station superstructure during assembly and disassembly of the missile as prescribed in chapter 3 and in TM 9-1440-301-12.

(4) *Firing set operator.* The firing set operator operates the firing set during the automatic self-test and countdown. Operator procedures are outlined in chapter 3 and in TM 9-1440-301-12.

(5) *Assistant firing set operator.* The assistant firing set operator assists the firing set operator in his performance of the duties listed in (4) above.

(6) *Senior AOS operator.* The senior AOS (azimuth orientation system) operator emplaces and employs the azimuth orientation unit (AOU) to orient the Sergeant missile and the launching station. He must be proficient in maintenance of the azimuth orientation unit. Care and use of the AOS equipment are outlined in chapter 3 and in TM 5-6675-233-15.

(7) *AOS operator.* The AOS operator operates the reference theodolite and assists the senior AOS operator in performing his duties.

(8) *Numbered crewmen and drivers.* The numbered crewman and drivers perform duties as prescribed in tables 2 through 5 and as directed by the chief of the firing section. Each section driver performs his share of required organizational maintenance on his assigned vehicle.

c. Missile Test Section Personnel.

(1) *Chief of the missile test section.* The chief of the missile test section is responsible to the platoon commander for—

(a) The training and efficiency of the missile test section crewman.

(b) The performance of duties in section drill, preparation for missile section tests, missile checkout, preparation for travel, and inspection and maintenance of all section equipment.

(c) The observance of safety precautions and the decontamination of equipment and materiel within the section.

(d) Camouflage training; local security and security training; and training in chemical, biological, and radiological defense.

(2) *Senior test station operator and test station operators.* The senior test station operator and the test station operators employ the organi-

zational maintenance test station to test the missile sections as prescribed in chapter 4 and in TM 5-4120-222-15, TM 5-6115-294-12, TM 5-6115-320-12, TM 9-1410-302-20, and TM 9-4935-303-12. They perform other duties as directed by the chief of the missile test section.

d. Ammunition Section Personnel.

(1) *Chief of the ammunition section.* The chief of the ammunition section is responsible to the platoon commander for—

(a) The handling and delivery of ammunition to the missile test and firing sections, as required. Security of the ammunition is a primary duty and a responsibility that requires constant alertness on the part of the chief of the ammunition section.

(b) The performance of organizational nonelectronic maintenance on missile sections.

(c) The observance of safety precautions and the decontamination of equipment and materiel within the section.

(d) Local security and the preparation of field fortifications for protection of personnel and equipment.

(e) Camouflage training; security training; and training in chemical, biological, and radiological defense.

(2) *Assistant chief of the ammunition section.* The assistant chief of the ammunition section assists the chief of the ammunition section in performing the duties described in (1) above.

(3) *Truck drivers.* Each truck driver performs his share of required organizational maintenance on his vehicle, as prescribed by the appropriate vehicle technical manual, and performs other duties as directed by the chief of the ammunition section.

(4) *Numbered crewmen.* The numbered crewmen of the ammunition section act as assistant drivers and assist the assigned drivers in performing maintenance on the vehicles. The crewmen perform nonelectronic maintenance on missile sections, perform maintenance on the ammunition containers, and perform other duties as directed by the chief of the ammunition section. If required, the crewmen may assist the firing section personnel.

CHAPTER 3

PREPARATION FOR ACTION AND TRAVELING

6. General

Both the firing platoon and the battery detail are involved in preparing for action.

a. Survey Section. The battery or battalion survey section extends survey control to the firing position. This action will be performed prior to the emplacement of the launching station. The survey team uses the procedures, techniques, and specifications set forth in FM 6-37 and in unit SOP (standing operating procedures). A detailed discussion of survey planning is contained in FM 6-2.

b. Communication Section. The battery communication section installs both wire and radio communications within the battery area as prescribed by unit SOP. The duties of the communication section are discussed in detail in FM 6-10 and in FM 6-37. Techniques for the installation and operation of wire and radio communications are described in FM 24-18 and FM 24-20.

c. Firing Section. The firing section emplaces the launching station and assembles and fires the missile.

d. Missile Test Section. The missile test section stores and transports missile and OMTS spare part for the firing battery and provides missile preassembly checkout and maintenance.

e. Ammunition Section. The ammunition section receives, physically checks, stores, and prepares ammunition for delivery to the firing section and the missile test section as required.

7. Launching Station

a. General. The selected firing position should be prepared prior to occupation. A level area is preferable, but the launching station may be emplaced on a slope not exceeding a grade of 1 in 10 (100 mils). Equipment limitations restrict the sector of fire of the Sergeant missile system to $\pm 1,067$ mils left and right of the centerline of the launching station. The sector of fire points toward the rear of the launching station. This restriction requires that the rear of the launching

station be pointed in the general direction of fire to insure first-countdown success.

b. Firing Position. The firing position includes the firing point and approaches to that point. A cleared circular area with a minimum diameter of 20 meters must be available for missile assembly. This area should include at least one good entrance and one good exit. If a firing position has only one approach, the diameter of the cleared circular area should be doubled to provide sufficient space for the transporter and launching station to turn around.

c. Ground Conditions for the Launching Station. If it is necessary to position the launching station on loose or soft soil, it may be necessary to reinforce the soil under the jack pads to prevent settling. However, this can be determined only through experience gained from training under varying field conditions.

d. Launching Station Settling. The weight of the missile and motions of the superstructure may cause the launching station to settle. Therefore, the level of the launching station must be checked after the missile has been assembled.

e. Prime Mover. The prime mover is a 5-ton tractor. It is used to tow the launching station to its position in the most expeditious manner consistent with concealment. The assistant chief of the firing section directs the driver of the prime mover to the desired position and halts the vehicle. Hand signals for guiding the driver are described in FM 21-60.

8. Procedures for Launching Station Emplacement

The duties of firing section personnel in emplacing the launching station and the sequence in which they are performed are given in table 2.

9. Preparation for Missile Assembly

a. As the launching station is being emplaced and leveled, the motor guidance transport trailer (MGTT) and the warhead section transporter are brought forward and positioned adjacent to the

launching station. A method of positioning the MGTT is shown in figure 2. The warhead section transporter may be positioned as shown in figure 3.

b. For safety, the warhead section transporter is not positioned closer than 75 meters to the launching station until the rocket motor section

has been engaged with the boom and the HOOKS ENGAGED indicator lamp has lighted.

c. The assistant chief of the firing section (ACS) is responsible for all signals during the assembly of the missile except those for emergency stops, which any crewman may give. The use of hand, voice, and light signals insures com-

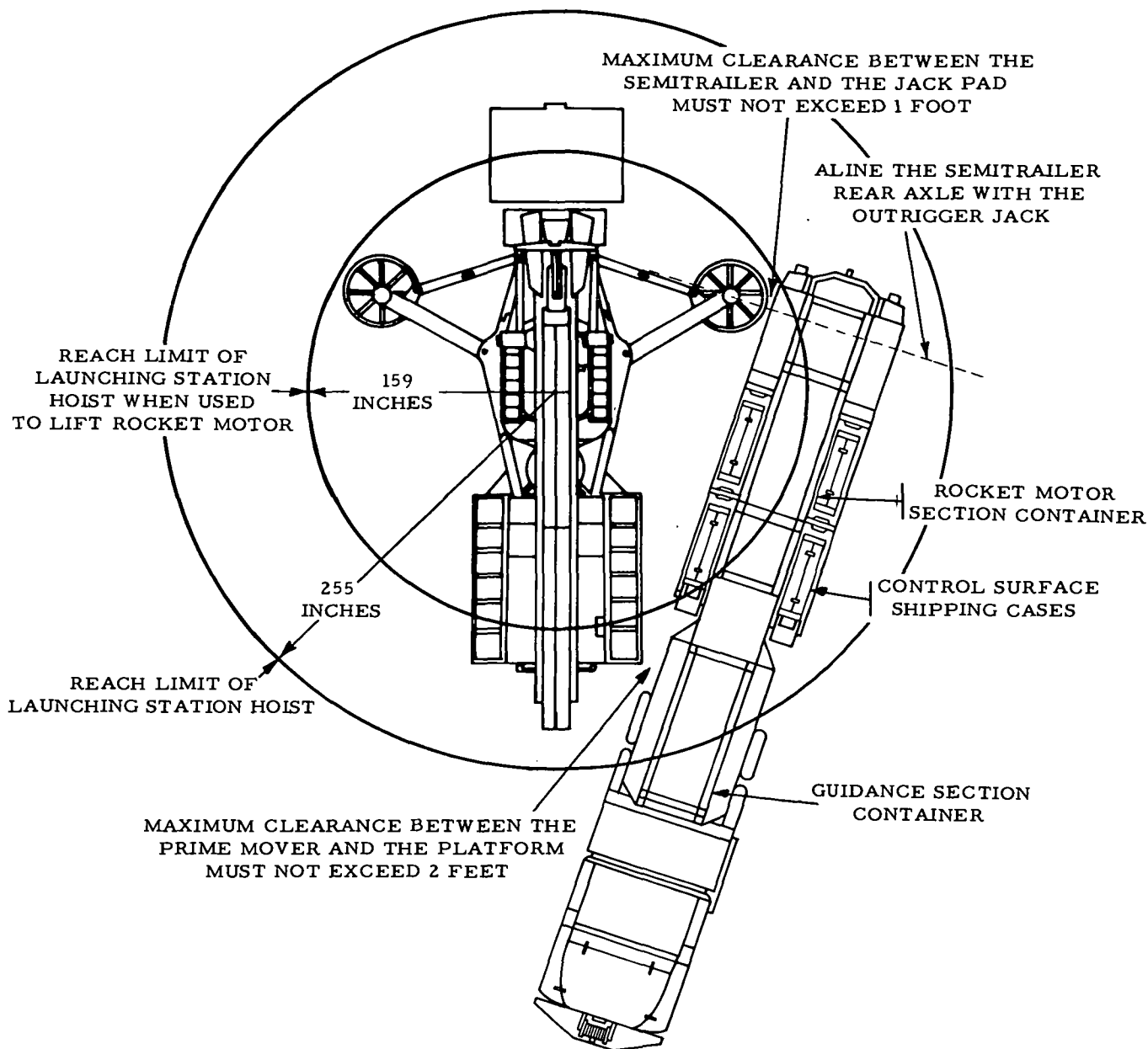


Figure 2. Positioning the motor guidance transport trailer.

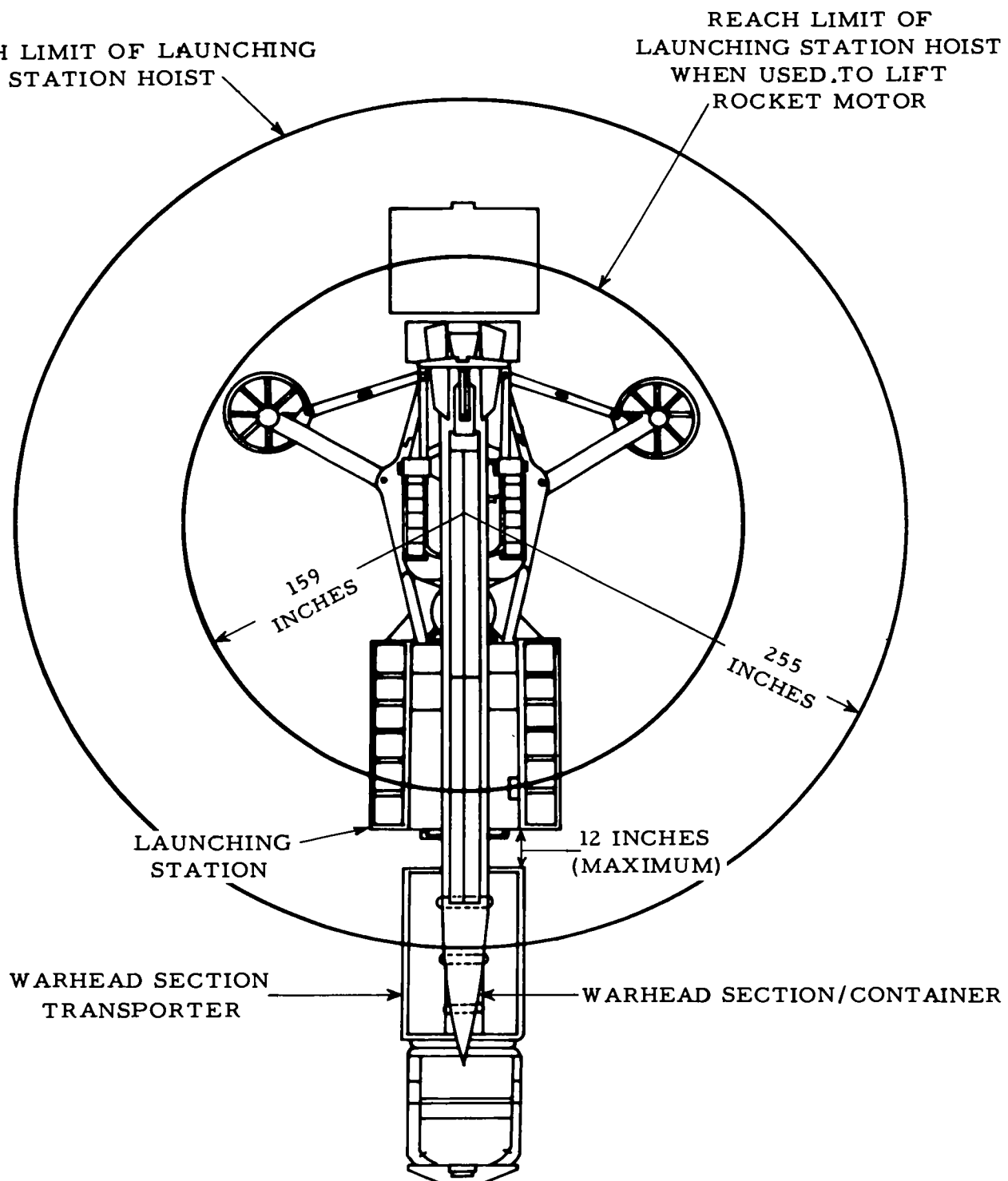
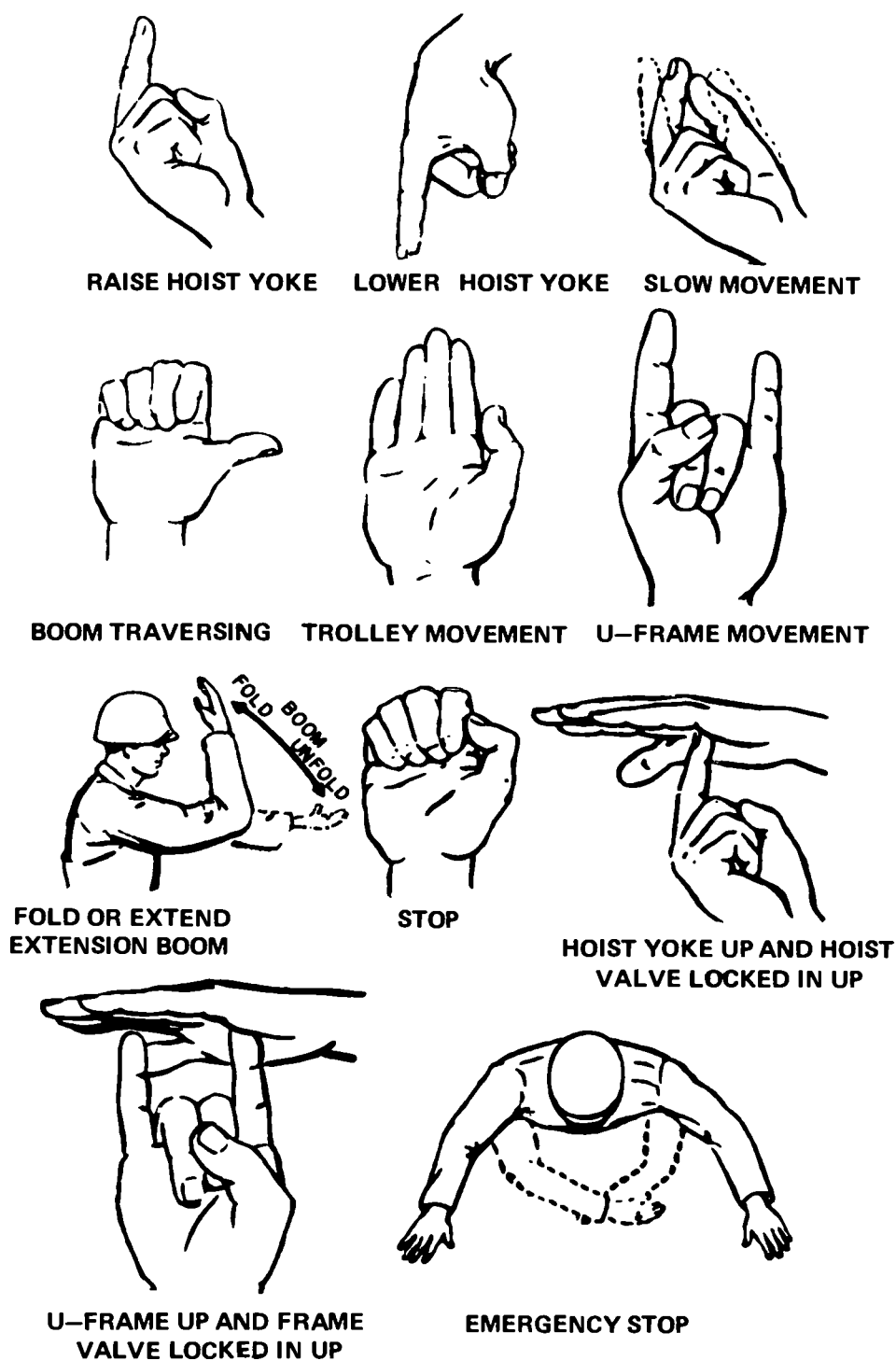


Figure 3. Positioning the warhead section transporter.

**NOTE:**

INVERTING SIGNAL MEANS
U-FRAME DOWN AND FRAME
VALVE LOCKED DOWN.

Figure 4. Hand signals for missile assembly and disassembly.

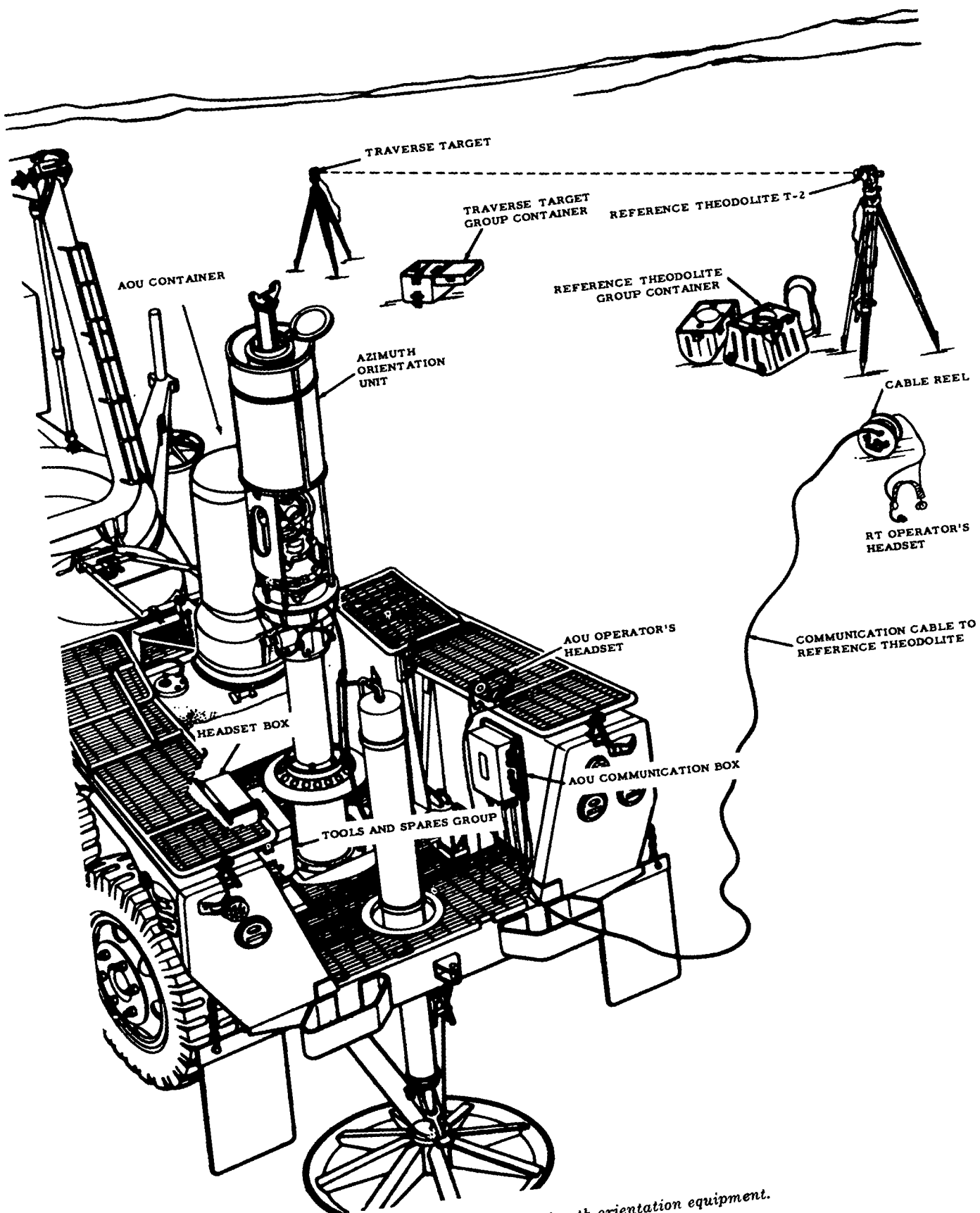


Figure 5. Azimuth orientation equipment.

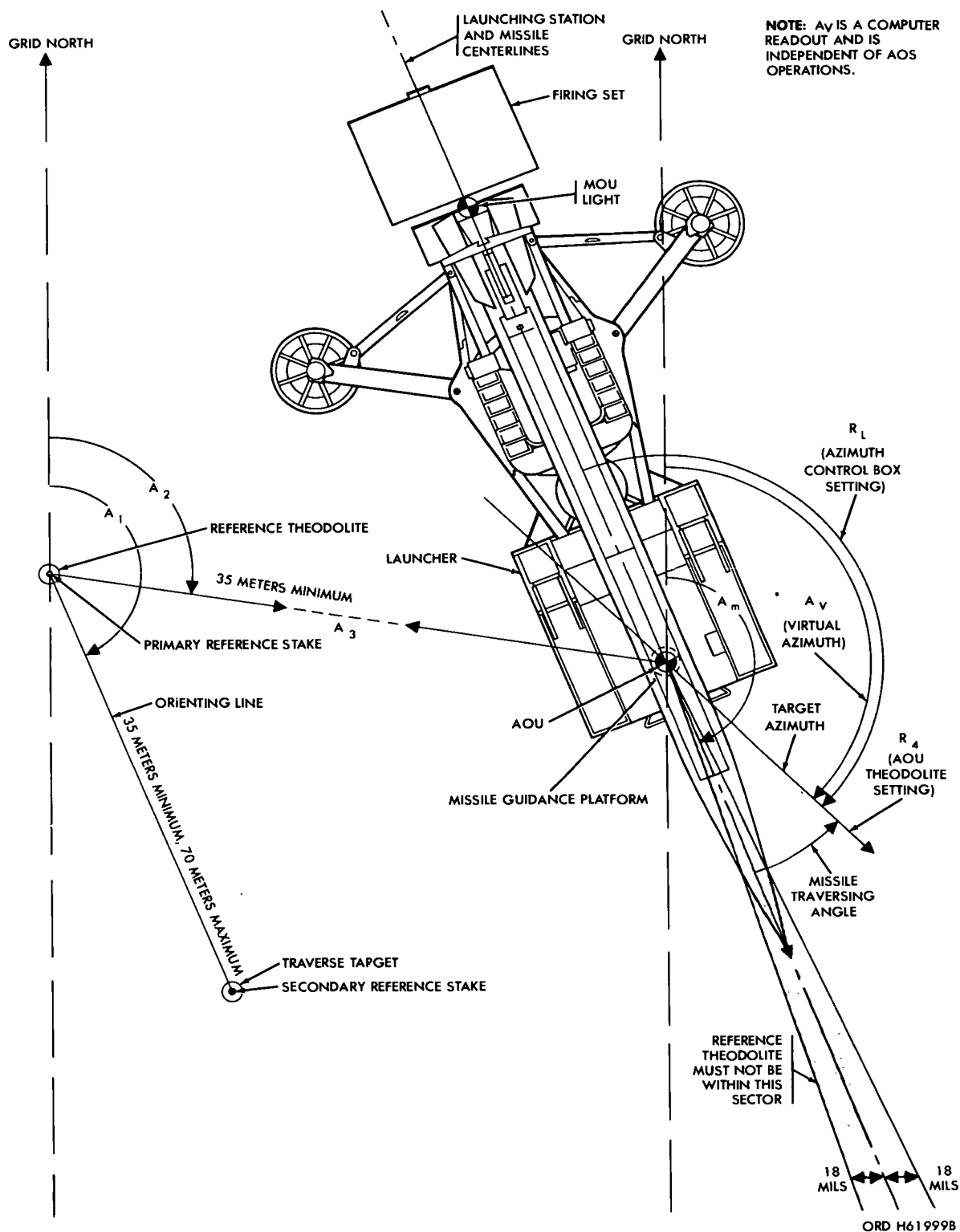


Figure 6. Azimuth orientation equipment positioning.

pletion of an operation in as short a time as possible commensurate with safe operating conditions for personnel and equipment. Hand signals for missile assembly and disassembly are shown in figure 4.

10. Emplacement of the Azimuth Orientation System Equipment

a. There are two azimuth orientation system (AOS) operators in the firing section. The senior AOS operator is responsible for the operation of the azimuth orientation unit (AOU) on the launching station, and the AOS operator is responsible for the operation of the reference theodolite (fig. 5 and 6).

b. The AOS operators emplace the reference theodolite and traverse target. They then plumb and level the reference theodolite over the primary reference stake and the traverse target over the secondary reference stake.

c. The senior AOS operator emplaces and levels the azimuth orientation unit. He checks with the assistant chief of the firing section to insure that the launching station is level.

d. The AOS operator may, at this time, use A_1 (the orienting line) as the starting azimuth and determine A_2 , A_3 , and A_m . The senior AOS operator transmits the values of A_m and A_1 to the firing set (FS) operator and chief of the firing section (CS) and records the values of A_1 , A_2 , and A_m on the AOS data form. Refer to figure 6 and table 2.

e. In performing the operations in b through d above, the AOS operator will follow the detailed instructions presented in TM 9-1440-201-12.

Note. There are two methods of performing AOS operations. The tactical situation at the firing position will determine which method is selected. The preferred method is to obtain all readings with the AOU mated to the inductosyn of an assembled missile. The second method is to obtain the "A" readings prior to missile assembly, mate the AOU and inductosyn after missile assembly is completed, and then obtain the "R" readings.

11. Missile Assembly

Warning: Before opening the shipping container of a chemical or biological warhead section, personnel in the area must put on the protective mask and gloves.

a. The missile sections are assembled into a complete missile on the launching station boom. Missile assembly is accomplished using the procedures illustrated in figures 4 and 7 through 13 and described in table 3 and TM 9-1440-301-12.

b. The chief of the firing section furnishes the

rocket motor temperatures to the firing set operator as soon as they are obtained.

(1) The chief of the firing section (or a designated crewman) and the firing set operator compute the effective motor temperature parameter prior to the start of the countdown by using a nomograph (table 6 at the back of the manual) or the following formula:

$$Q = (0.84)T_c + (0.16)T_A, \text{ when—}$$

Q = effective temperature.

T_c = cavity (motor nozzle) temperature.

T_A = aft body (tail fairing) temperature.

(2) For further information, refer to FM 6-40-2.

c. Prior to X-15 minutes, the assistant firing set operator removes the cable and firing box from the door of the firing set, makes the necessary cable connections, and then—

(1) Contacts the firing set operator to insure that he is ready to check the firing box and cabling.

(2) Insures that the power-selector switch on at least one of the two firing set power distribution boxes is in the POWER ON position to test the firing box and checks the firing box.

12. Preparation of the Firing Set

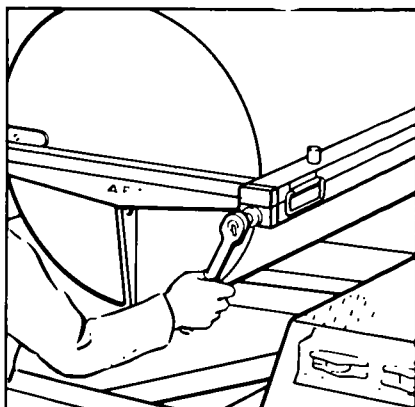
a. The firing set operator should start firing set operations as soon as the launching station is emplaced.

b. The firing set includes two identical electronic systems, which are referred to as system A and system B. Both systems may be self-tested simultaneously. Detailed instructions pertaining to the firing set self-test are contained in TM 9-1440-301-12.

13. Hold Procedures and Limits

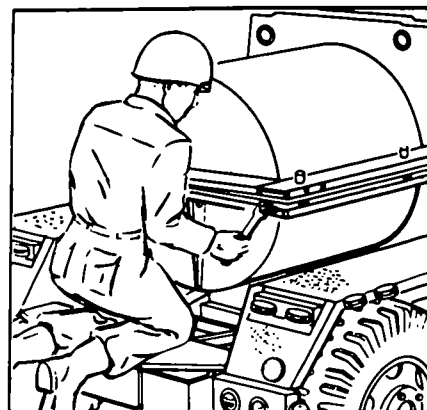
The word "hold" describes the suspension of the firing procedure. There are two major types of holds which can occur in the Sergeant missile system—a command hold and a failure hold. A third type of hold which occurs once during every countdown is the automatic programmed hold. This hold, which occurs at X-2 minutes, is considered to be a command hold, since it may be utilized as such.

a. *Command Hold.* A command hold can be called at any time during the automatic countdown period. However, the length of the hold depends on the time at which the hold is called. Once the firing set has been readied to conduct a

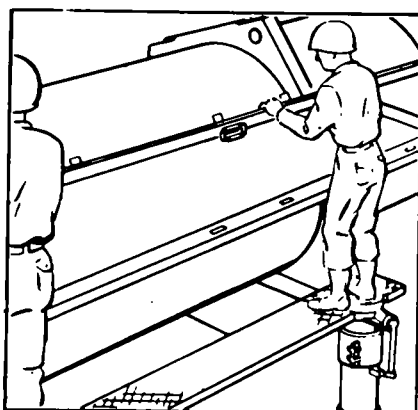
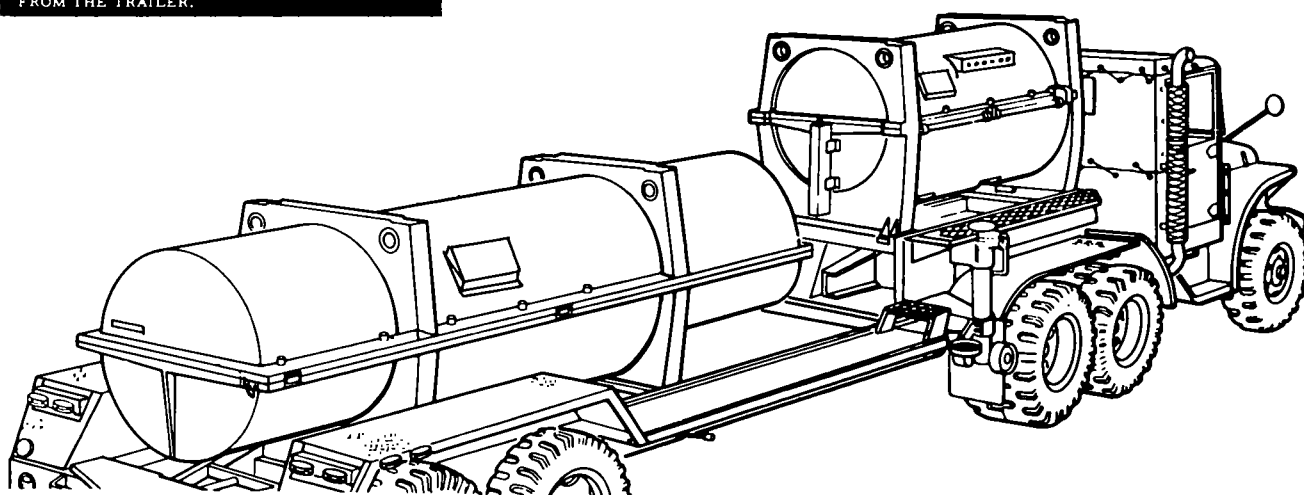


1. REMOVE THE LATCH SCREW DUST CAP BY TURNING THE CAP COUNTER CLOCKWISE TO RELEASE ANY AIR PRESSURE.

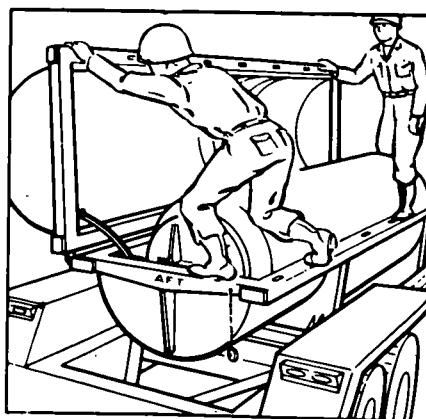
NOTE. CHECK TO SEE THAT THE CONTAINER IS BOLTED DOWN BEFORE OPENING THE LID. IF THE CONTAINER IS EMPTY, IT WILL FALL FROM THE TRAILER.



2. TURN THE LATCH SCREW COUNTER CLOCKWISE UNTIL THE LID SPRINGS PARTIALLY OPEN.

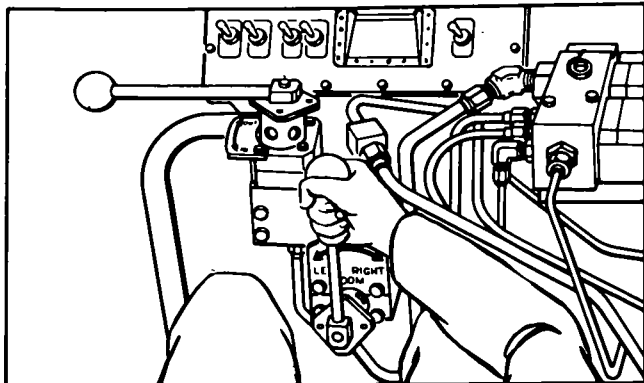


3. WITH ONE MAN AT EACH END, RAISE THE CONTAINER LID TO THE BALANCED POSITION.



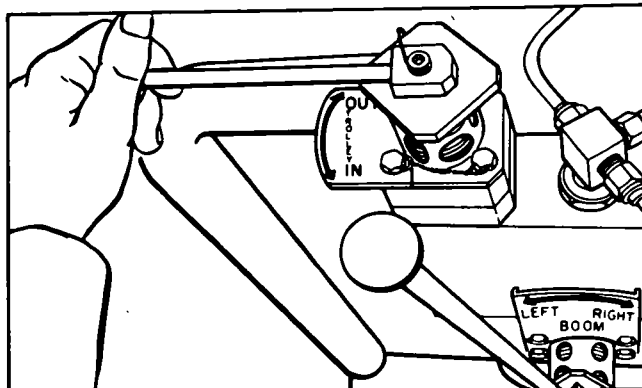
4. LOWER THE CONTAINER LID CAREFULLY TO THE TRAVEL LIMIT OF THE RESTRAINING ARM. REMOVE THE TWO PRIMER BAGS FROM THE CONTAINER AND PLACE THEM IN A SAFE LOCATION.

Figure 7. Opening a missile section container.



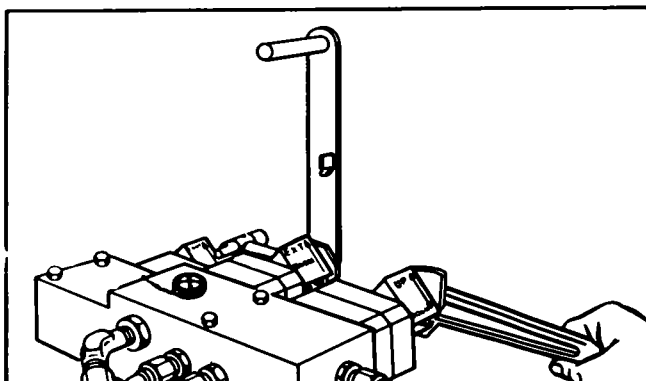
1. PLACE THE BOOM RIGHT-LEFT VALVE TO EITHER RIGHT OR LEFT UNTIL THE BOOM IS POSITIONED OVER THE ROCKET MOTOR CONTAINER.

NOTE. RIGHT POSITION MOVES THE BOOM CLOCKWISE, AND LEFT POSITION MOVES THE BOOM COUNTER CLOCKWISE.



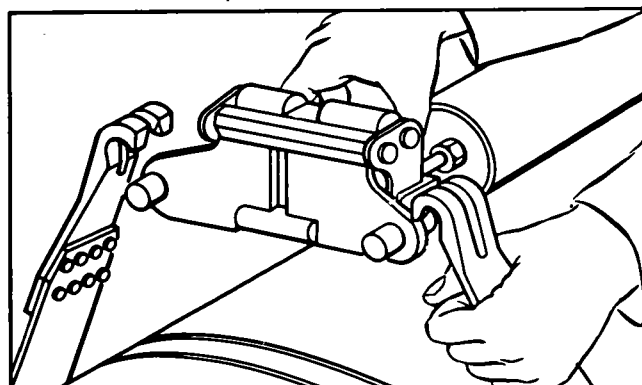
2. PLACE THE FRAME VALVE TO UP UNTIL THE U-FRAME STOPS AT THE FULL-EXTENDED POSITION; THEN LOCK THE FRAME VALVE IN THE UP POSITION. PLACE THE TROLLEY VALVE TO OUT UNTIL THE TROLLEY IS IN POSITION OVER THE ROCKET MOTOR HANDLING FIXTURE.

WARNING: DO NOT ALLOW THE TROLLEY TO TRAVEL OUTWARD PAST THE PAINTED SAFETY MARK ON THE BOOM.

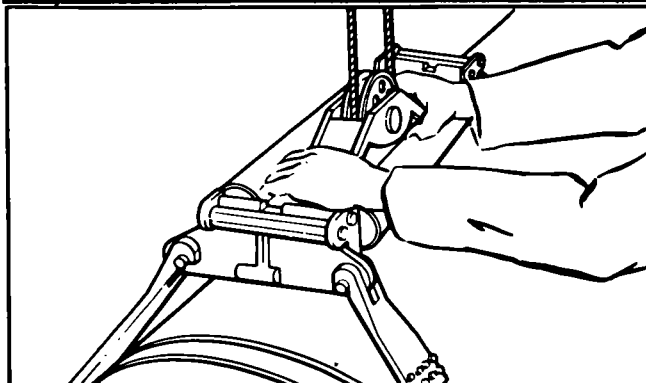


3. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOIST IS IN POSITION TO ENGAGE THE ROCKET MOTOR HANDLING FIXTURE.

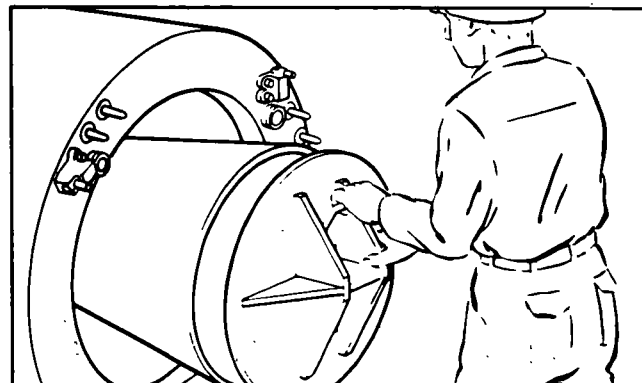
CAUTION: NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.



4. HOOK THE ENDS OF THE ROCKET MOTOR HANDLING FIXTURE ON THE HOIST HANGER PINS.

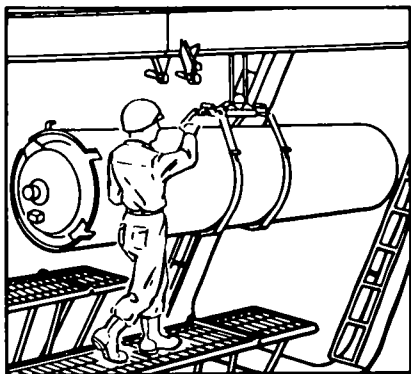


5. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE SLACK IS GONE FROM THE HOIST CABLE. CHECK THE HANDLING FIXTURE FOR PROPER ENGAGEMENT WITH THE HOIST HANGER PINS.

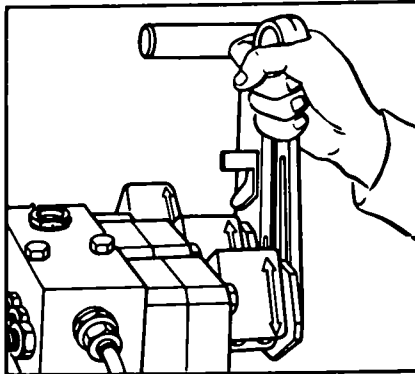


6. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE ROCKET MOTOR CLEARS THE CONTAINER. REMOVE THE NOZZLE CLAMP AND PLATE FROM THE ROCKET MOTOR AND PLACE THEM IN THE CONTAINER.

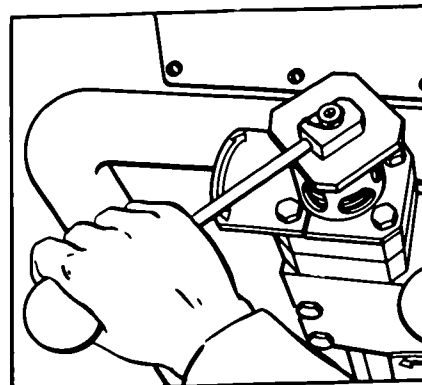
Figure 8. Removing the rocket motor from the rocket motor container.



1. ALINE THE ROCKET MOTOR WITH THE BOOM.

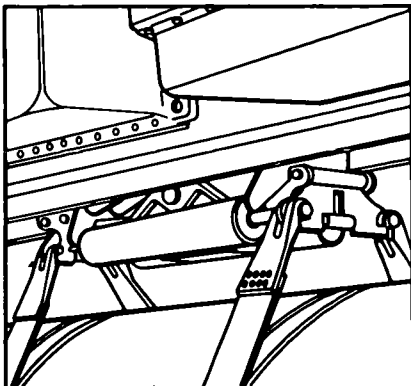


2. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE ROCKET MOTOR IS APPROXIMATELY 6 INCHES FROM THE BOOM.

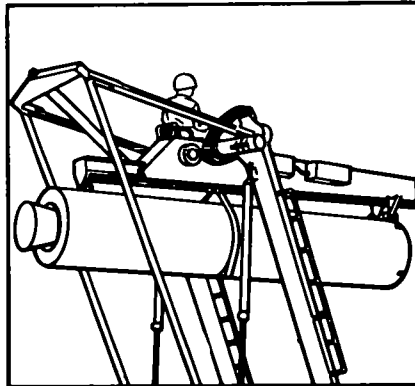


3. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE ROCKET MOTOR HANDLING FIXTURE IS CLEAR OF THE FORWARD HANGERS.

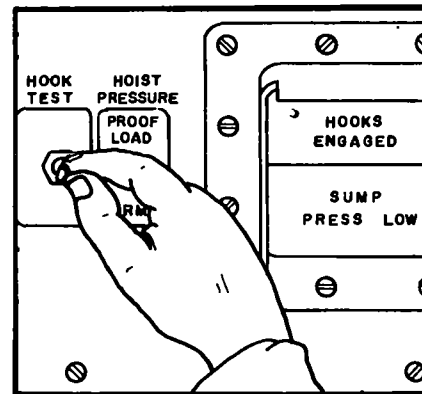
CAUTION: NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.



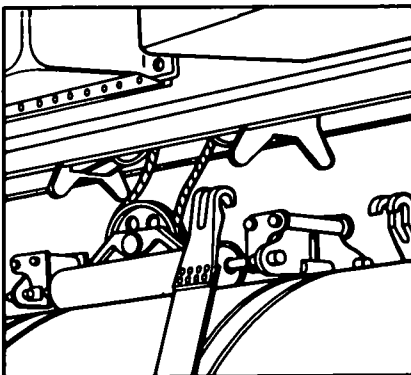
4. PLACE THE HOIST VALVE IN THE UP POSITION. LOCK THE VALVE IN THE UP POSITION WHEN THE ROCKET MOTOR IS IN THE FULLY UP POSITION.



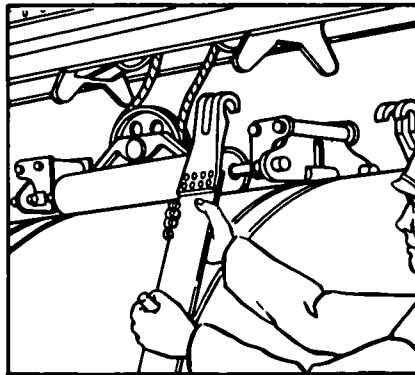
5. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE ROCKET MOTOR ENGAGES THE FORWARD AND REAR HANGERS.



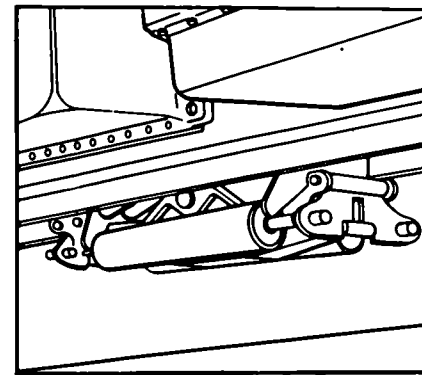
6. OPERATE THE HOOK TEST SWITCH AND INSURE THAT THE HOOKS ENGAGED INOICATOR LAMP ILLUMINATES. VISUALLY AFFIRM THAT ALL HOOKS ARE ENGAGED.



7. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOIST CABLE BEGINS TO SLACKEN.

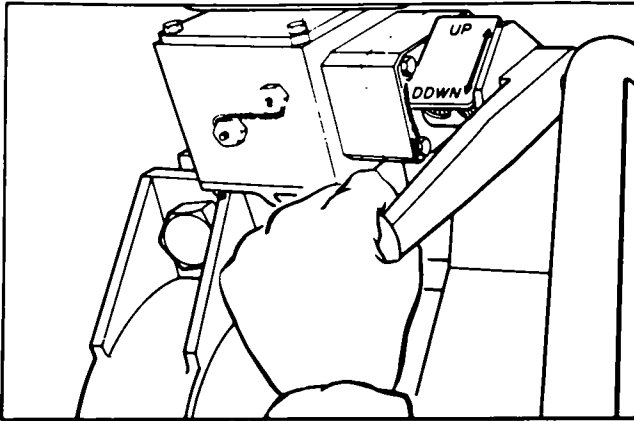


8. UNHOOK THE ENDS OF THE ROCKET MOTOR HANDLING FIXTURE FROM THE HOIST HANGER PINS. DISENGAGE THE HANDLING FIXTURE FROM THE ROCKET MOTOR BY LIFTING UP ON EACH HANOLING FIXTURE HANDLE. RETURN THE ROCKET MOTOR HANDLING FIXTURE TO THE ROCKET MOTOR CONTAINER.

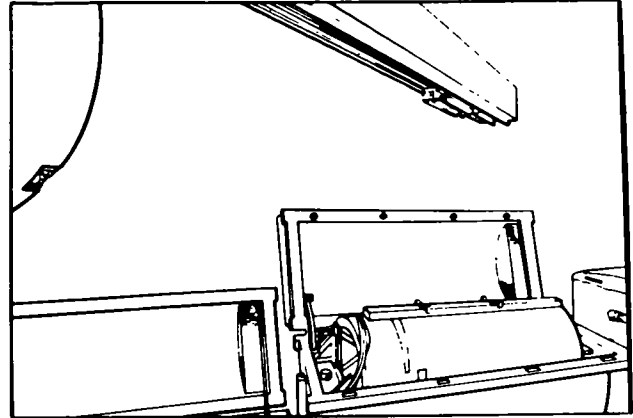


9. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST IS SEATED IN THE TROLLEY.

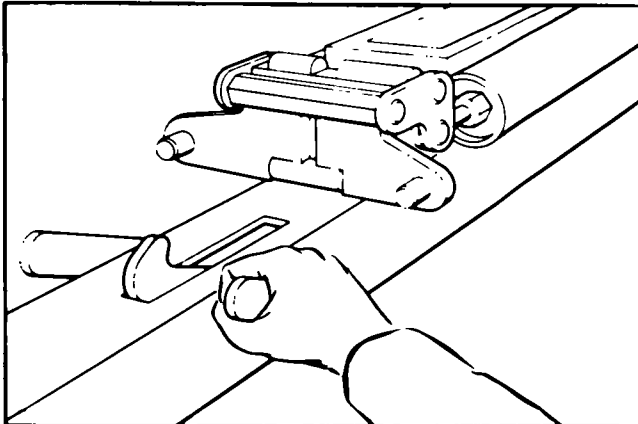
Figure 9. Engaging the rocket motor with the boom hangers.



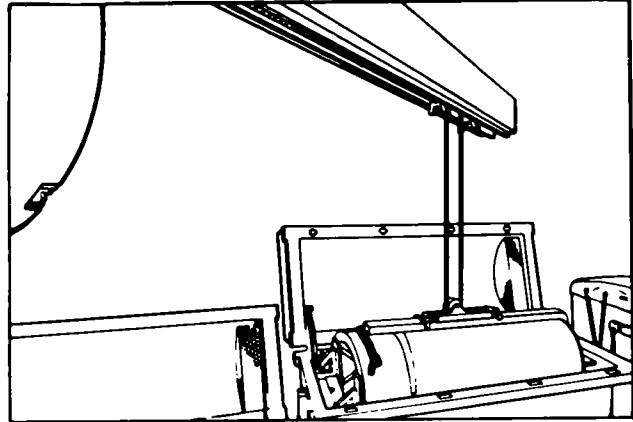
1. PLACE THE FRAME VALVE IN THE DOWN POSITION UNTIL THE FRAME ACTUATORS ARE RETRACTED TO THE MECHANICAL STOPS.



2. POSITION THE BOOM OVER THE GUIDANCE SECTION AND PLACE THE TROLLEY VALVE IN THE OUT POSITION UNTIL THE TROLLEY IS IN POSITION OVER THE GUIDANCE SECTION.

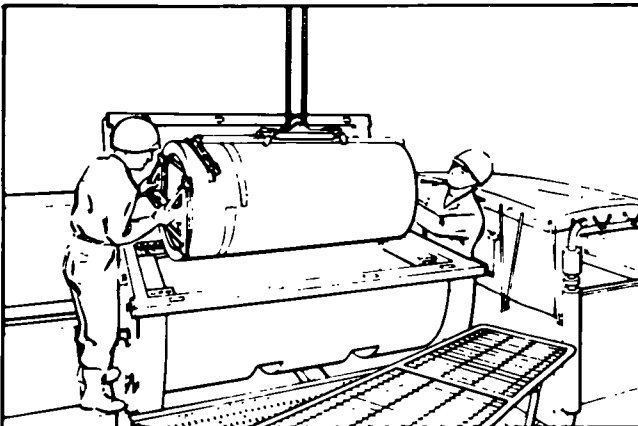


3. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOIST CAN BE HOOKED ON THE GUIDANCE SECTION HANDLING FIXTURE.

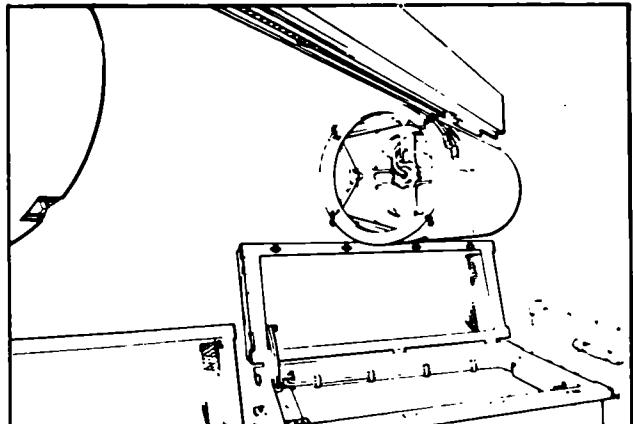


4. DISCONNECT THE NINE CONTAINER ELECTRICAL CONNECTORS FROM THE GUIDANCE SECTION AND REMOVE THE FORWARD- AND REAR-SUPPORT T-BOLTS. DRAPE THE GUIDANCE SECTION CABLES OVER THE GUIDANCE SECTION. SWING THE HOIST HANGERS DOWN AND ENGAGE THEM WITH THE HOOKS ON THE GUIDANCE SECTION HANDLING FIXTURE.

CAUTION: NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.

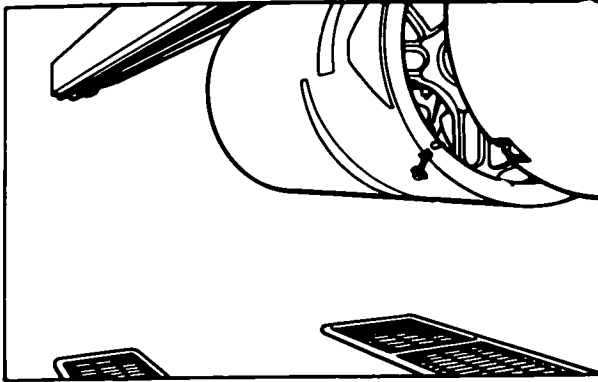


5. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE GUIDANCE SECTION CLEARS THE CONTAINER. REMOVE THE FORWARD AND REAR SUPPORTS.

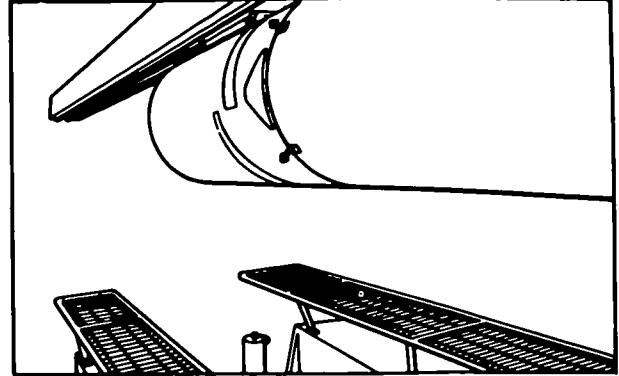


6. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST SEATS IN THE TROLLEY.

Figure 10. Removing the guidance section from its container.

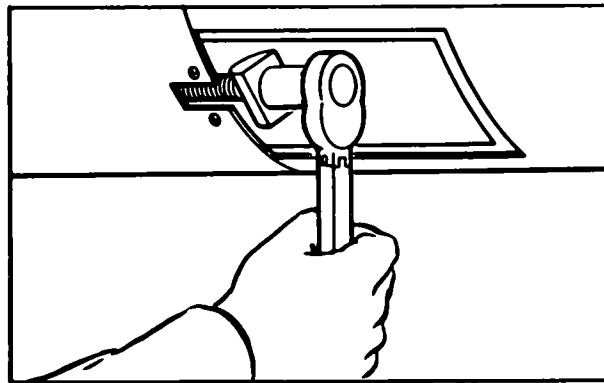


1. PLACE THE BOOM RIGHT LEFT VALVE IN THE RIGHT OR LEFT POSITION UNTIL THE BOOM IS POSITIONED OVER THE WORK PLATFORMS.

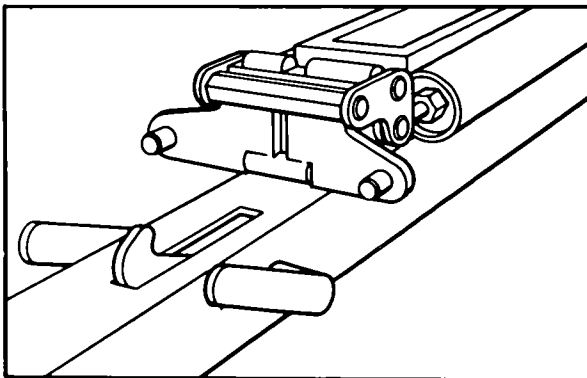


2. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE GUIDANCE SECTION MATES WITH THE ROCKET MOTOR.

WARNING: KEEP HANDS CLEAR OF THE GAP BETWEEN THE GUIDANCE SECTION AND ROCKET MOTOR.

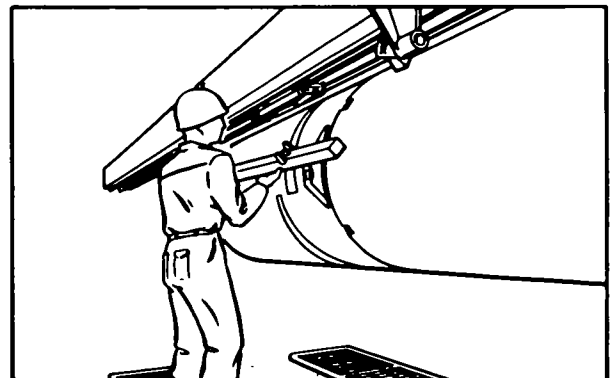


3. ATTACH THE GUIDANCE SECTION TO THE ROCKET MOTOR BY TIGHTENING THE GUIDANCE SECTION SWING BOLTS. TIGHTEN THE SWING BOLTS FIRST WITH A SPEED WRENCH; THEN USE A TORQUE WRENCH TO TIGHTEN THE BOLTS TO 1,250 INCH-POUNDS OF TORQUE.



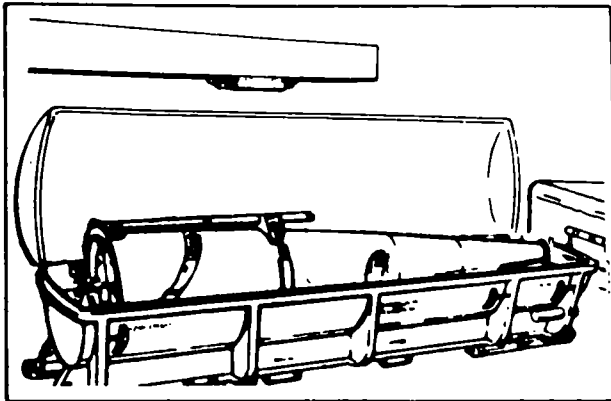
PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOOKS IN THE GUIDANCE SECTION HANDLING FIXTURE DISENGAGE THE HOIST, THEN PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST IS SEATED IN THE TROLLEY.

CAUTION: DO NOT ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.



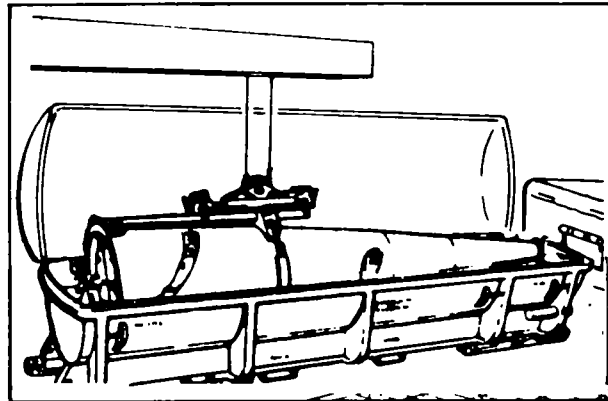
5. REMOVE THE GUIDANCE SECTION HANDLING FIXTURE FROM THE GUIDANCE SECTION AND RETURN IT TO THE GUIDANCE SECTION CONTAINER.

Figure 11. Assembling the guidance section and the rocket motor.



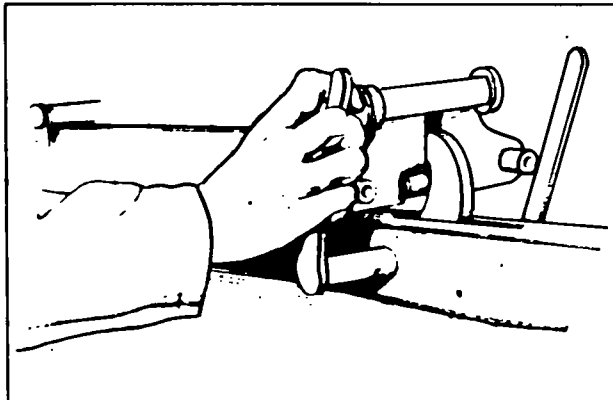
1. PLACE THE BOOM RIGHT LEFT VALVE TO THE RIGHT OR LEFT POSITION UNTIL THE BOOM IS POSITIONED OVER THE WARHEAD SECTION CONTAINER; THEN PLACE THE TROLLEY VALVE IN THE OUT POSITION UNTIL THE TROLLEY IS POSITIONED OVER THE WARHEAD SECTION.

NOTE. THE FRAME VALVE MAY BE PLACED IN THE UP POSITION AS REQUIRED FOR PROPER POSITIONING OF THE TROLLEY OVER THE WARHEAD SECTION.



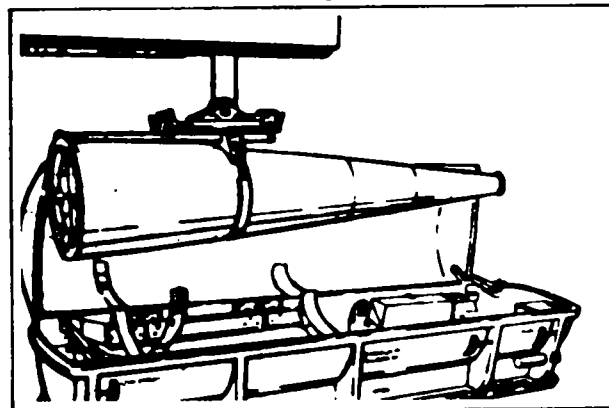
2. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOIST RESTS ON THE WARHEAD SECTION HANDLING FIXTURE.

CAUTION: NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN IS NECESSARY.



3. SWING THE HOIST HANGERS DOWNWARD AND ENGAGE THEM WITH THE HOOKS ON THE WARHEAD SECTION HANDLING FIXTURE.

CAUTION: INSURE THAT THE WARHEAD SECTION DOES NOT HIT ANY MISSILE SECTION CONTAINER DURING ROTATION.

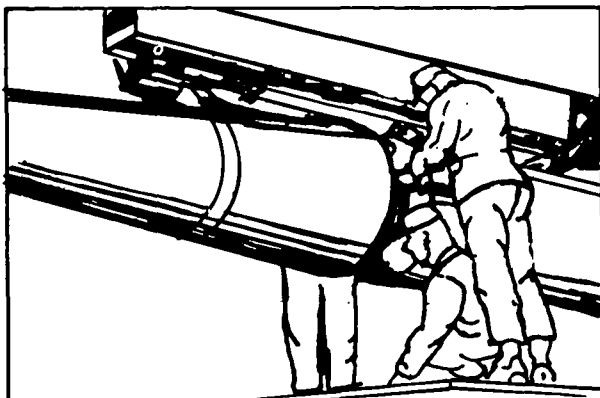


4. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE WARHEAD SECTION CLEARS THE WARHEAD SECTION CONTAINER. INSTALL THE WARHEAD STATIC TUBE ASSEMBLY. REMOVE THE SAFE PLUG AND INSTALL THE FIRE PLUG.

Figure 12. Removing the warhead section from its container.

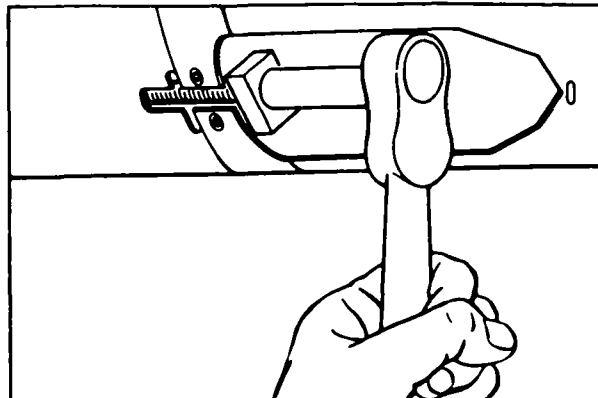
countdown, a command hold can be sustained for varying periods of time with the length of the hold depending on various conditions, such as the amount of fuel available for the gas turbine generator sets. If a command hold is called between X-15 minutes and X-7 minutes 30 seconds, the system must be reset to X-15 minutes before the countdown can be continued. The length of the hold at X-15 minutes is indefinite. If a command hold is called between X-7 minutes 30 seconds and X-2 minutes, the system must be reset to either X-7 minutes 30 seconds or to

X-15 minutes before the countdown can be continued. The length of the hold at X-7 minutes 30 seconds is indefinite; however, the system should be counted down to X-3 minutes approximately once an hour and then reset to X-7 minutes 30 seconds. (This insures that the firing set and missile are still operational and that a failure during the latter part of the countdown is improbable.) If a command hold is called at X-2 minutes, it can be sustained for 10 minutes. If a command hold is called at X-2 minutes, If a command hold is called after X-2 minutes, the

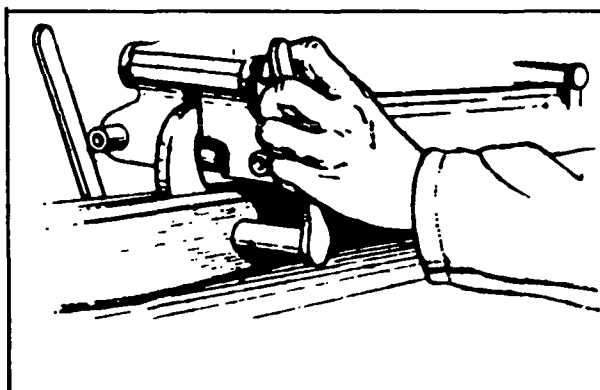


1. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST IS SEATED IN THE TROLLEY. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE WARHEAD SECTION MATES WITH THE GUIDANCE SECTION.

WARNING: KEEP HANDS CLEAR OF THE GAP BETWEEN THE WARHEAD SECTION AND THE GUIDANCE SECTION.

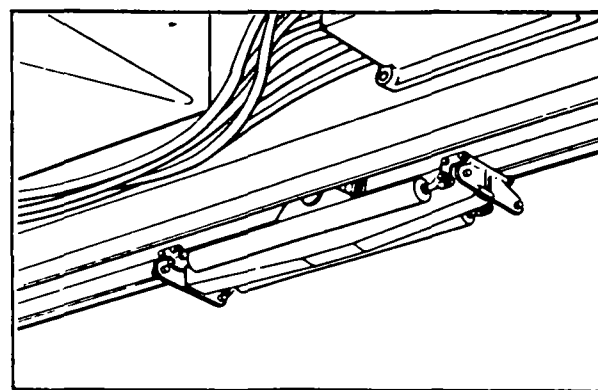


2. TIGHTEN THE WARHEAD SECTION SWING BOLTS FIRST WITH A SPEED WRENCH; THEN USE A TORQUE WRENCH TO TIGHTEN THE BOLTS TO 1,250 INCH-POUNDS OF TORQUE.

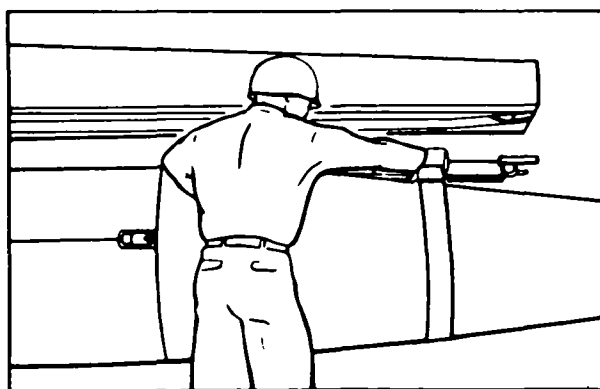


3. PLACE THE HOIST VALVE IN THE DOWN POSITION UNTIL THE HOOKS IN THE WARHEAD SECTION HANDLING FIXTURE DISENGAGE THE HOIST.

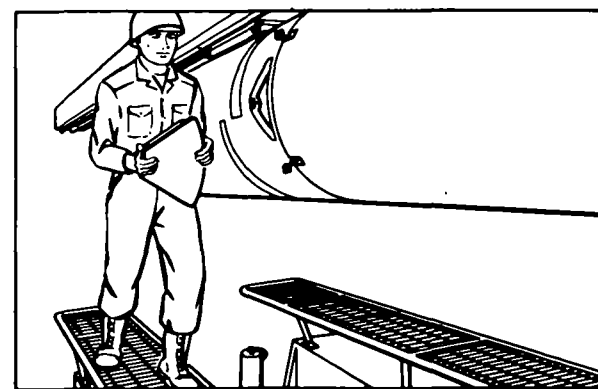
CAUTION: NEVER ALLOW ANY MORE SLACK IN THE HOIST CABLE THAN NECESSARY.



4. PLACE THE HOIST VALVE IN THE UP POSITION UNTIL THE HOIST IS SEATED IN THE TROLLEY. PLACE THE TROLLEY VALVE IN THE IN POSITION UNTIL THE TROLLEY STOPS.



5. REMOVE THE WARHEAD SECTION HANDLING FIXTURE FROM THE WARHEAD SECTION. RETURN THE WARHEAD SECTION HANDLING FIXTURE TO THE CONTAINER.



6. REMOVE THE GS ACCESS DOOR FOR ELECTRICAL CONNECTIONS BETWEEN THE GUIDANCE SECTION AND THE ROCKET MOTOR.

Figure 13. Assembling the warhead section and the guidance section.

countdown cannot be reset. If a command hold is called at or after X-90 seconds and before X-20 seconds, the countdown will continue to X-20 seconds and then stop. The hold at X-20 seconds cannot exceed 2 minutes. If a command hold is called between X-20 seconds and X-100 milliseconds, the countdown will continue to X-100 milliseconds and then stop. The hold at X-100 milliseconds similarly cannot exceed 2 minutes. Further, the total holding time at X-20 seconds and afterwards cannot exceed 2 minutes. Information on command holds is presented in chart form in table 1 at the back of the manual.

b. Failure Hold. A failure hold may occur at any time during the automatic countdown. Each time a failure hold occurs, the countdown must be reset to X-15 minutes. A failure hold is caused by the sensing circuits, which stop the programmer assembly, light the HOLD lamp, and indicate the area of the failure.

c. Procedure. If a command hold or failure hold occurs during the automatic countdown, refer to TM 9-1440-301-12 for specific hold procedures. See TM 9-1100-300-12 for information on special warhead section hold procedures.

14. Firing Procedures

Procedures for firing the missile generally are outlined in this paragraph. The missile firing procedures consume the last 15 minutes before firing.

a. The fire mission normally will call for a time on target (TOT). The time to fire is obtained as follows:

(1) Obtain the time of flight for the mission. Refer to the time-of-flight graph in FM 6-40-2.

(2) Add 90 seconds to the time of flight to compensate for the automatic sequencing of the countdown.

(3) Subtract the total obtained in (2) above from the predicted time on target. The result is the time at which, while the unit is at X-2 minutes and holding, the FIRE-HOLD switch must be placed in the FIRE position to meet the time-on-target requirement.

b. As soon as the missile has been assembled, the senior AOS operator positions and inserts the alinement tube as shown in figure 14. He then alines the guidance platform to the firing azimuth with the azimuth orienting unit as shown in figure 15. As he obtains readings, the senior AOS operator records them on the AOS work sheet.

c. Operation of the firing set requires attentiveness to duty and procedure. A general outline of duties is listed below; for detailed instructions, refer to TM 9-1440-301-12.

Note. Although a command hold may be placed into the firing set at any time during the countdown, all information within the firing set computer will be retained even though the power is turned off. Prior to starting operations again, the firing set operator should check the information stored in the memory unit of the firing set computer.

(1) At X-15 minutes, the firing set operator begins the countdown as described in (a) through (h) below and illustrated in figures 16, 17, 18, and 19.

(a) *X-15 minutes.* The firing set operator presses the START PROGRAM button on the monitor control panel.

(b) *X-12 minutes.* Refer to steps 3, 4, and 5, figures 16 and 17.

(c) *Prior to X-3 minutes.* The chief of the firing section or assistant chief of the firing section, assisted by crewman number 1, inserts the cartridge actuating device into the rocket motor (fig. 18). All personnel except the firing set operator evacuate the firing area.

(d) *X-3 minutes.* The LEAVE STATION lamp starts to blink. The firing set operator leaves the station and proceeds to the remote firing position and waits for the X-2 MIN lamp to illuminate on the remote firing box (fig. 19).

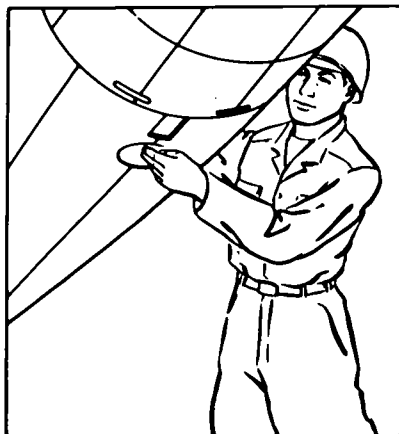
(e) *V-2 minutes.* The X-1 MIN lamp illuminates (fig. 19). The firing set operator waits for the command to fire, at which time he places the FIRE-HOLD switch to the FIRE position.

(f) *X-90 seconds.* The X-90 SEC lamp illuminates when the FIRE-HOLD switch is placed to the FIRE position (fig. 19).

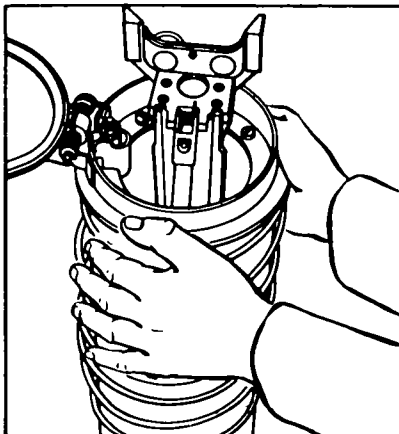
(g) *X-20 seconds.* The X-20 SEC indicator lamp on the firing box illuminates (fig. 19).

Note. If the FIRE-HOLD switch on the remote firing box is placed to the HOLD position between X-90 seconds and X-20 seconds, the actual hold will not occur until just prior to X-20 seconds. Once the countdown has passed X-20 seconds, placing the FIRE-HOLD switch to the HOLD position will cause a hold to occur at X-100 milliseconds. The total hold time after X-90 seconds cannot exceed 2 minutes. If the hold exceeds this limitation, it will be necessary to lower the missile, reset the firing set to X-15 minutes, and replace the missile battery or missile guidance section.

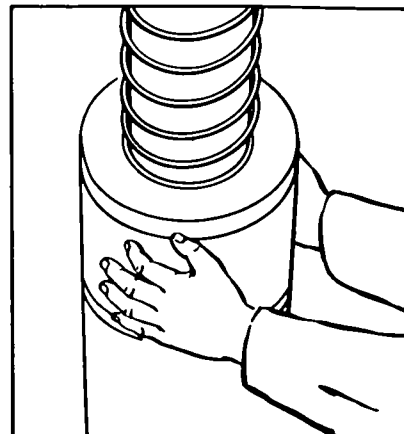
(h) *X-0 seconds.* The missile fires, unless the FIRE-HOLD switch has been placed to the HOLD position. As soon as the missile leaves the



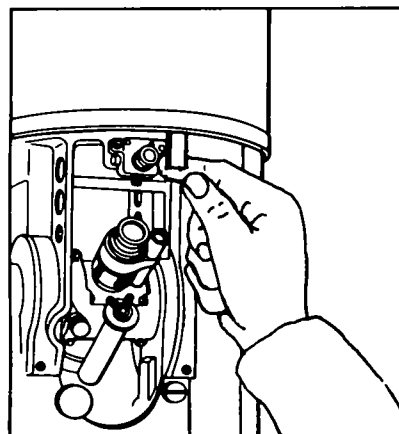
1. OPEN THE ACCESS DOOR ON THE UNDERSIDE OF THE GUIDANCE SECTION. PULL THE INDUCTOSYN COVER LOOSE.



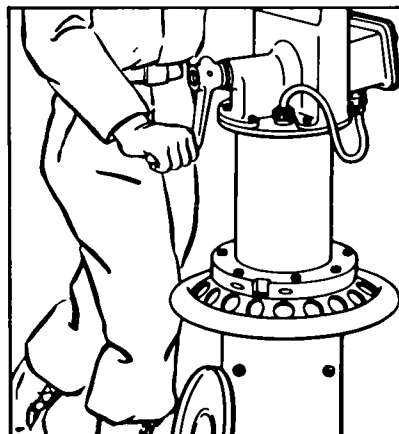
2. DEPRESS THE UPPER BLAST SHIELD. INSURE THAT THE AOU AND LAUNCHING STATION ARE LEVEL.



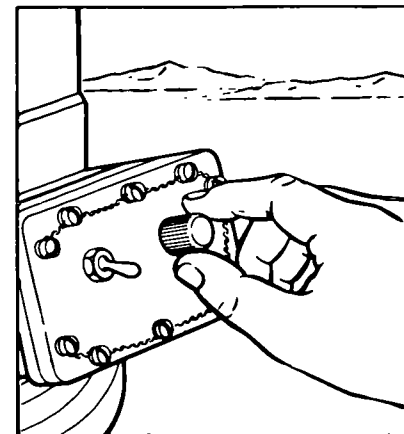
3. POSITION THE AOU ALINEMENT FLATS TOWARD THE FIRING SET.



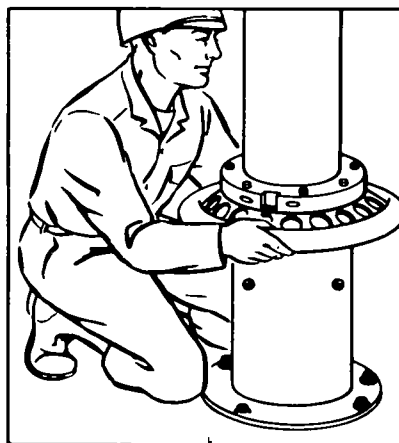
4. RAISE THE CAM FOLLOWER ON THE AOU ALINEMENT TUBE.



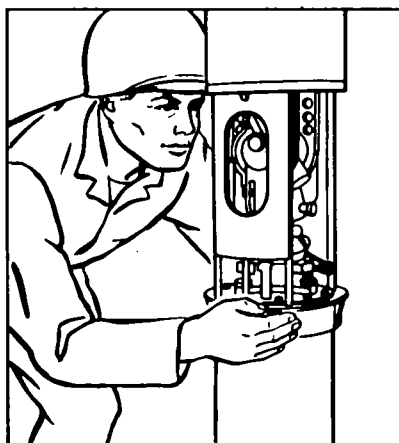
5. CRANK THE PEDESTAL UP TO START THE TUBE INTO THE GUIDANCE SECTION ACCESS DOOR.



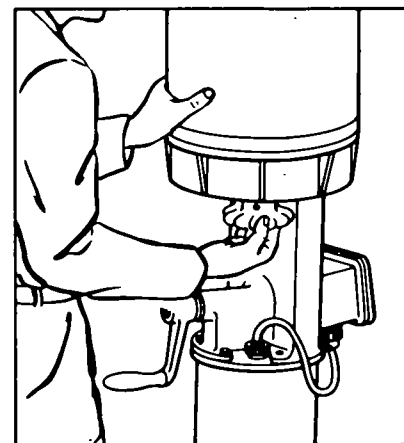
6. TURN ON THE AOU COLLIMATION LIGHT.



7. RAISE THE PEDESTAL UNTIL IT IS STOPPED. TURN THE HANDWHEEL TO LOCK THE PEDESTAL.

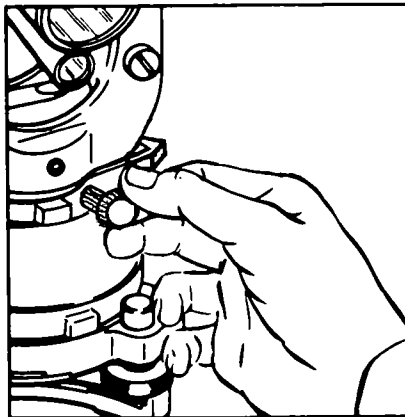
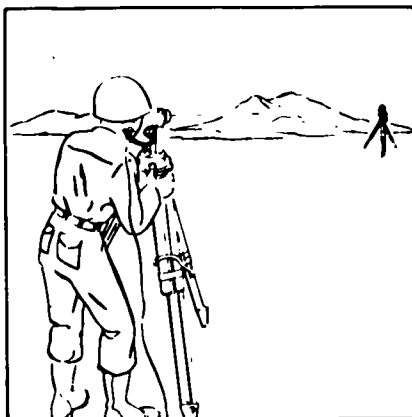
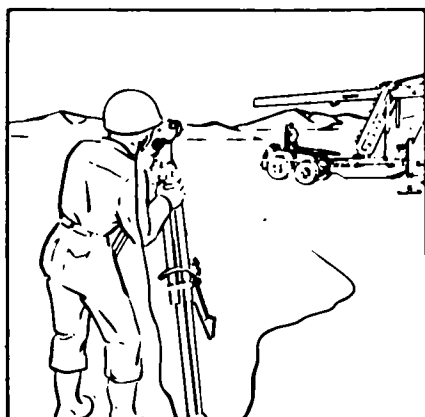


8. SEE THAT THE BEAD AND CROSSHAIRS ARE ALINED WITH THE CENTER OF THE INDUCTOSYN SHAFT (THROUGH THE OPTICAL PLUMMET) AND THAT THE CAM FOLLOWER IS RELEASED.

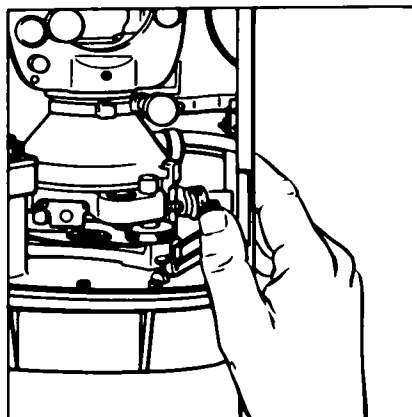
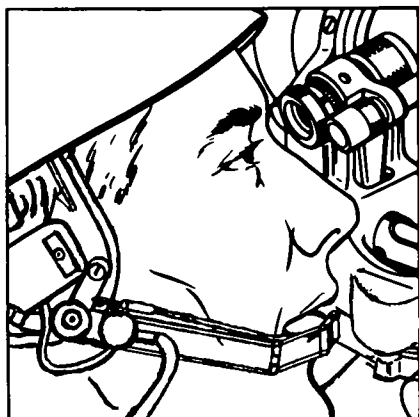


9. ADJUST AOU POSITIONING IF NECESSARY.

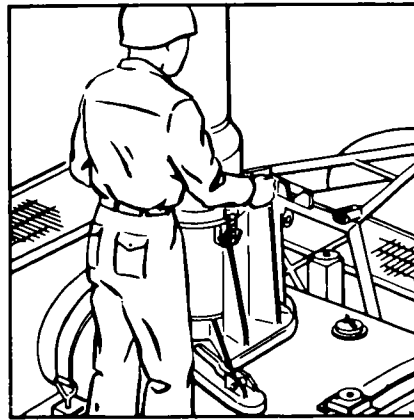
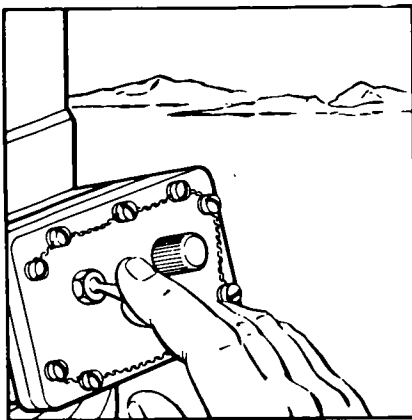
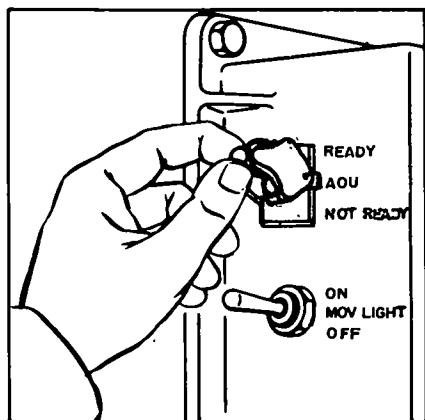
Figure 14. Inserting the alinement tube.



1. UNLOCK THE HORIZONTAL CIRCLE ON THE AOU AND SET THE CIRCLE TO SOME RANDOM READING, R_0 . LOCK THE CIRCLE.
2. TURN ON THE TRAVERSE TARGET LIGHT. REPEAT STEP 1 ON THE REFERENCE THEODOLITE. SIGHT THE REFERENCE THEODOLITE ON THE TRAVERSE TARGET TO OBTAIN R_1 .
3. QUALIFY THE AOU AND THE REFERENCE THEODOLITE. THE REFERENCE THEODOLITE OPERATOR WILL THEN HAVE R_2 ON HIS HORIZONTAL CIRCLE. HE WILL TRANSMIT THE R_1 AND R_2 VALUES TO THE AOU OPERATOR.

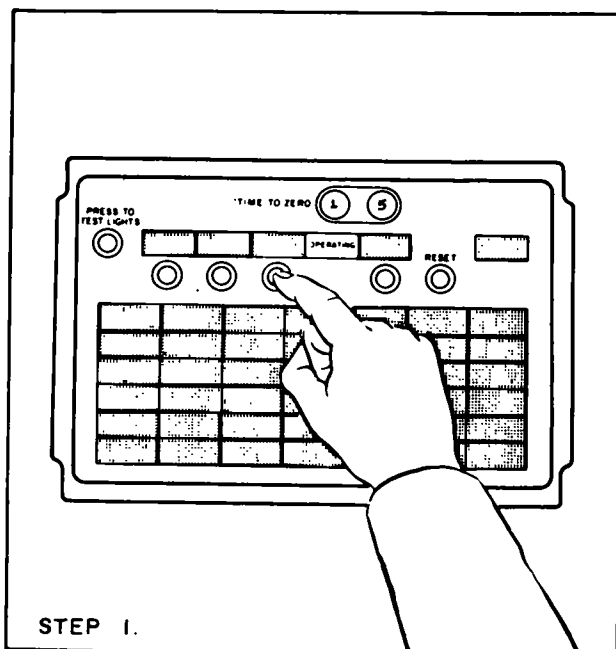


4. READ THE AOU HORIZONTAL CIRCLE AND RECORD THIS VALUE, R_3 . TRANSMIT R_1 , R_2 , AND R_3 TO THE FIRING SET OPERATOR.
5. RECEIVE THE COMPUTED VALUE R_4 FROM THE FIRING SET OPERATOR. ROTATE THE AOU TO THIS SETTING AS SHOWN BY THE HORIZONTAL CIRCLE.

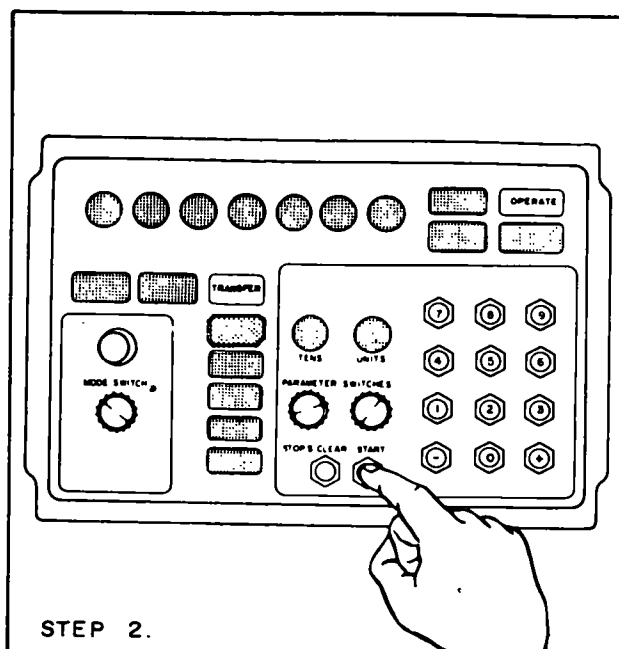


6. PLACE THE AOU READY LIGHT SWITCH ON THE AOU COMMUNICATIONS BOX TO THE ON POSITION. UNPLUG THE AOU HEADSET FROM THE AOU COMMUNICATIONS BOX.
7. TURN OFF THE AOU COLLIMATION LIGHT. LOWER THE BLAST SHIELD TO THE MONITORING (PARTIALLY CLOSED) POSITION.
8. REINSTALL THE AOU CONTAINER IN ITS TRAVEL POSITION. CAREFULLY CLIMB DOWN AND WALK TO A SAFETY AREA.

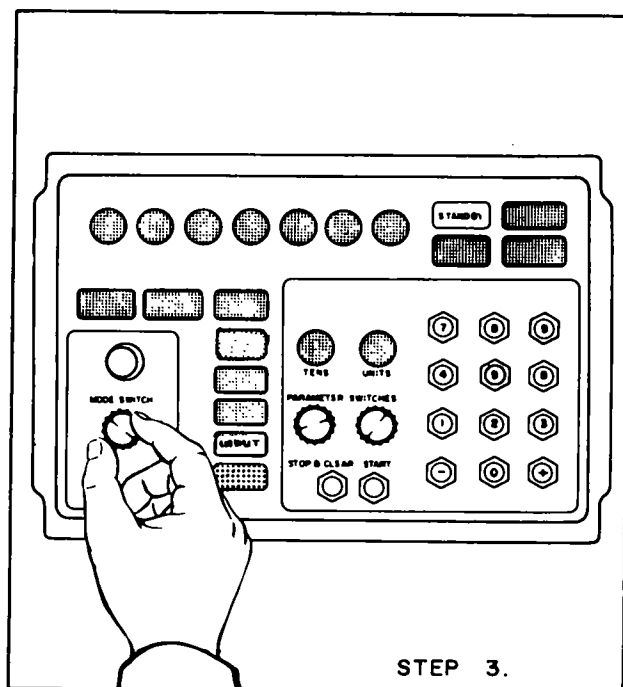
Figure 15. Alining the azimuth orientation unit.



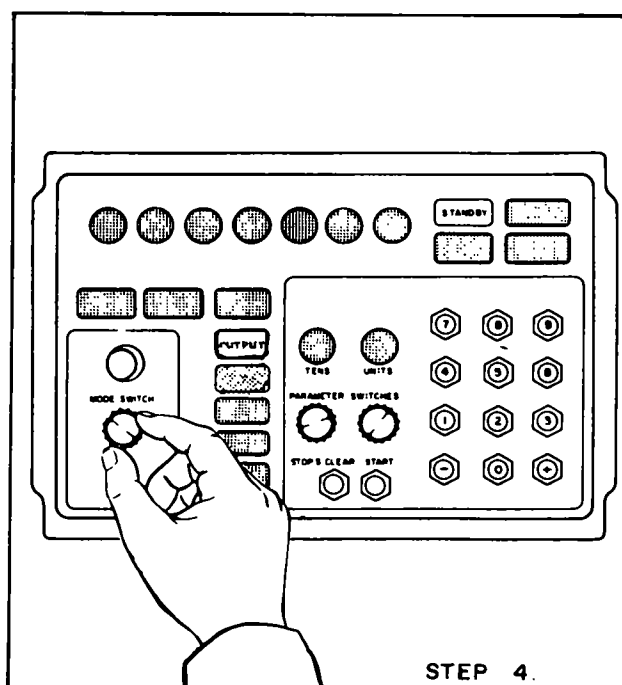
1. DEPRESS THE START PROGRAM BUTTON. THE START PROGRAM INDICATOR LAMP WILL CEASE TO GLOW AND THE OPERATING INDICATOR LAMP WILL GLOW.



2. PRESS THE START BUTTON. THE STANDBY LAMP WILL CEASE TO GLOW; THE OPERATE INDICATOR LAMP WILL START TO GLOW AND WILL GLOW UNTIL TRANSFER IS COMPLETE. AT APPROXIMATELY X-12 MINUTES, THE OPERATE LAMP WILL CEASE TO GLOW AND THE STANDBY LAMP WILL GLOW AGAIN.



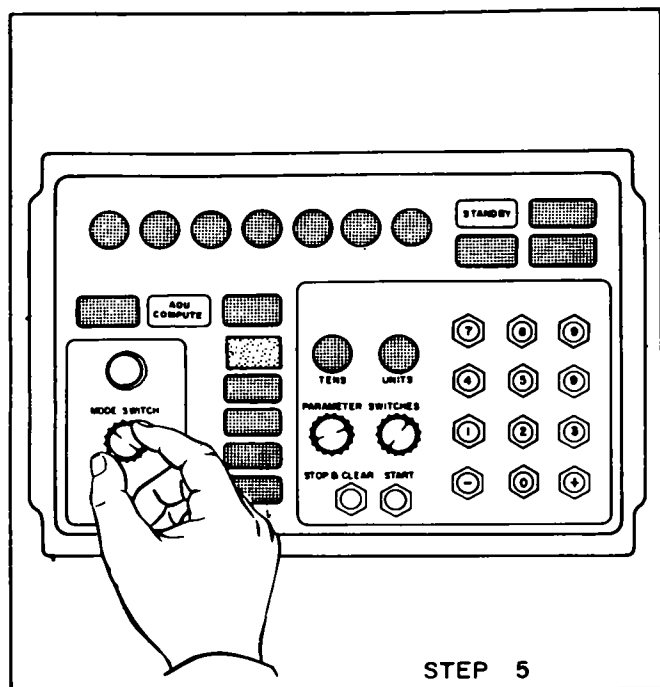
3. ROTATE THE MODE SWITCH UNTIL THE INPUT INDICATOR LAMP GLOWS. ENTER INPUTS R_1 , R_2 , AND R_3 , AND DEPRESS THE START BUTTON.



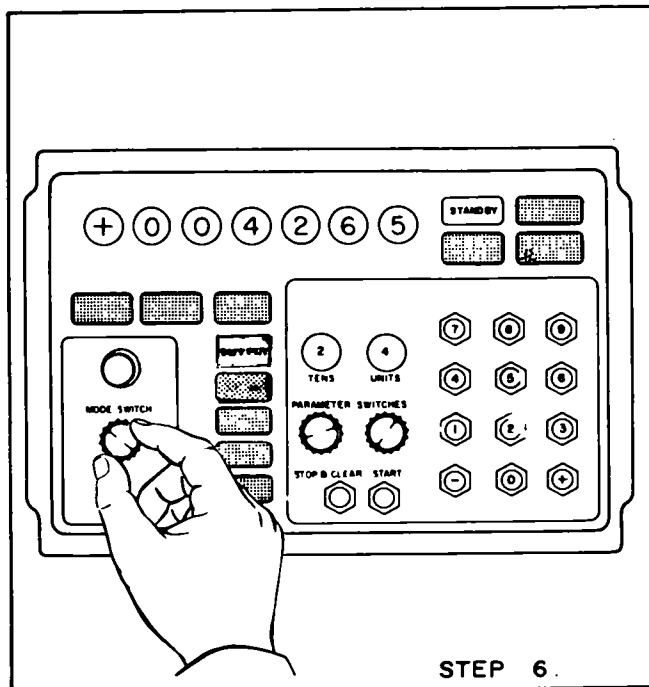
4. ROTATE THE MODE SWITCH UNTIL THE OUTPUT INDICATOR LAMP GLOWS.

NOTE. VERIFY THE INPUTS ENTERED IN STEP 3.

Figure 16. Operations during automatic countdown (steps 1 through 4).



5. ROTATE THE MODE SWITCH UNTIL THE AOU COMPUTE INDICATOR LAMP GLOWS. DEPRESS THE START BUTTON.



6. POSITION THE PARAMETER SWITCHES TO SHOW THE DIGITS 2 AND 4 ON THE TENS AND UNITS INDICATORS. ROTATE THE MODE SWITCH UNTIL THE OUTPUT INDICATOR LAMP GLOWS. DEPRESS THE START BUTTON. READ THE VALUE (THE R_4 PARAMETER) ON THE NUMERICAL INDICATORS TO THE AOU OPERATOR AND THE CHIEF OF SECTION. DEPRESS THE STOP & CLEAR BUTTON.

Figure 17. Operations during automatic countdown (steps 5 and 6).

launcher, the firing set operator presses the SAFE button on the firing box.

(2) At T+1 minute, the firing set operator enters the firing set inclosure and places the appropriate transfer switch to the TEST position. He presses the CLEAR PROGRAM button on the monitor-control panel and confirms fired data if needed. In the meantime, the boom operator returns the boom to the horizontal position. The chief of the firing section checks for blast and fire damage.

15. March Order of the Launching Station

If an assembled missile is to be disassembled because of the cancellation of the fire mission, because of a malfunction, or for training purposes, the firing section will perform disassembly procedures as outlined in TM 9-1440-301-12. Figures 2 and 3 of this manual illustrate the positioning of the MGTT and warhead section transporter, figure 4 illustrates the hand signals to be used during operations, figure 7 provides guidance for opening the missile section containers, and figure 20 illustrates removal of the cartridge actuating

device from the rocket motor. Table 4 prescribes duties in missile section disassembly, and table 5 prescribes duties in the march order of launching station equipment.

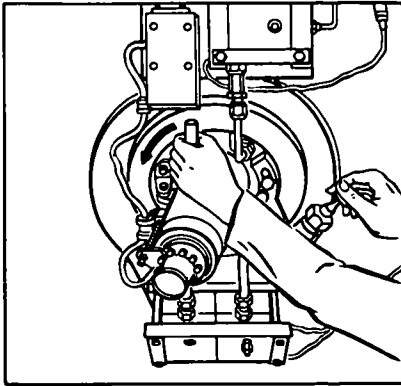
16. Preparation for Missile Disassembly

a. The firing set operator enters the firing set and pushes the CLEAR PROGRAM button on the monitor control panel. He then resets the warhead section baroswitches. The boom operator, supervised by the assistant chief of the firing section, lowers and centers the missile between the work platforms.

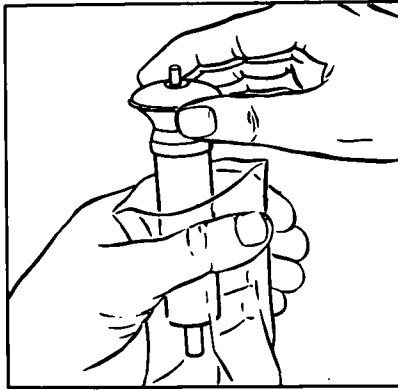
b. The chief of the firing section or the assistant chief of the firing section removes the cartridge actuating device from the rocket motor (fig. 20) before any other disassembly step is taken.

Note. Personnel who are not actually involved in positioning the boom will remain clear of the area until the cartridge actuating device has been removed.

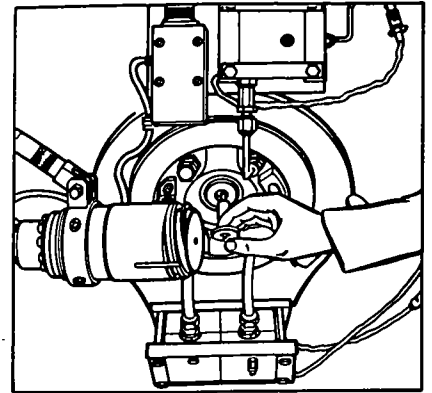
c. As soon as the cartridge actuating device has been removed, the warhead section trans-



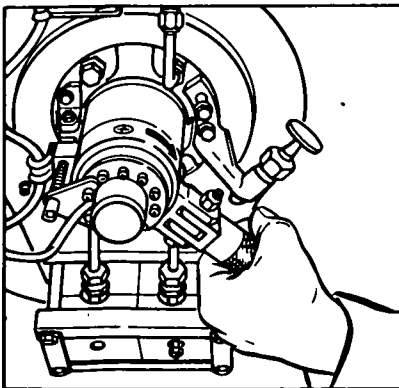
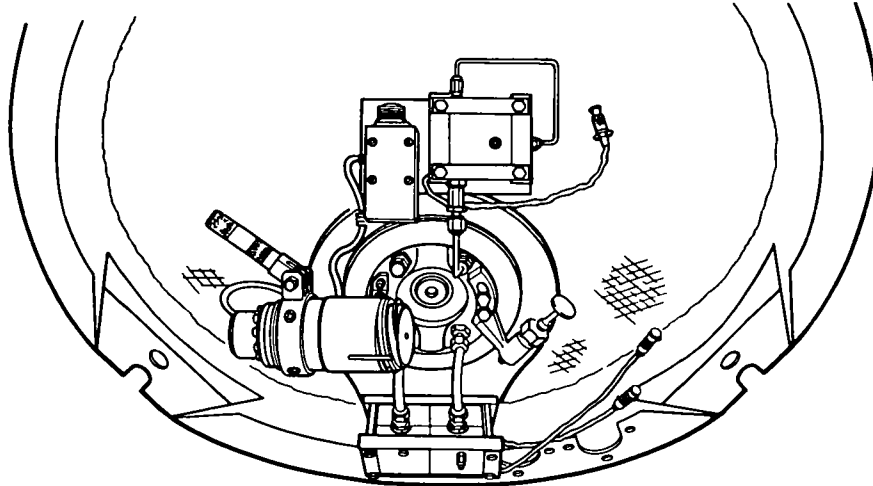
1. REACH THROUGH THE GS ACCESS DOOR AND PULL UP ON THE BREECH HANDLE LOCK ON THE FRONT OF THE ROCKET MOTOR. SWING THE BREECH HANDLE OUTWARD AND ROTATE THE HANDLE COUNTERCLOCKWISE.



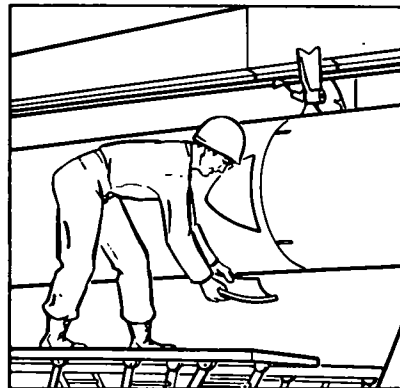
2. REMOVE THE CARTRIDGE ACTUATING DEVICE FROM ITS PLASTIC CONTAINER.



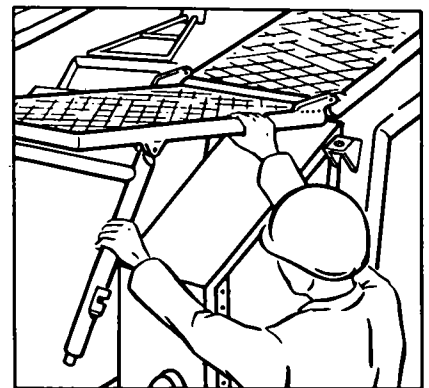
3. FOLD BACK THE INITIATOR ASSEMBLY AND INSERT THE CARTRIDGE ACTUATING DEVICE INTO THE CARTRIDGE ACTUATING DEVICE RECEPTABLE. PUSH THE CARTRIDGE ACTUATING DEVICE INSERTER RELEASE BUTTON AND REMOVE THE CARTRIDGE ACTUATING DEVICE INSERTER.



4. FOLD THE INITIATOR ASSEMBLY AND ROTATE IT IN PLACE WITH THE BREECH HANDLE. SWING THE BREECH HANDLE TOWARD THE MOTOR AND LATCH IT IN PLACE WITH THE BREECH HANDLE LOCK.

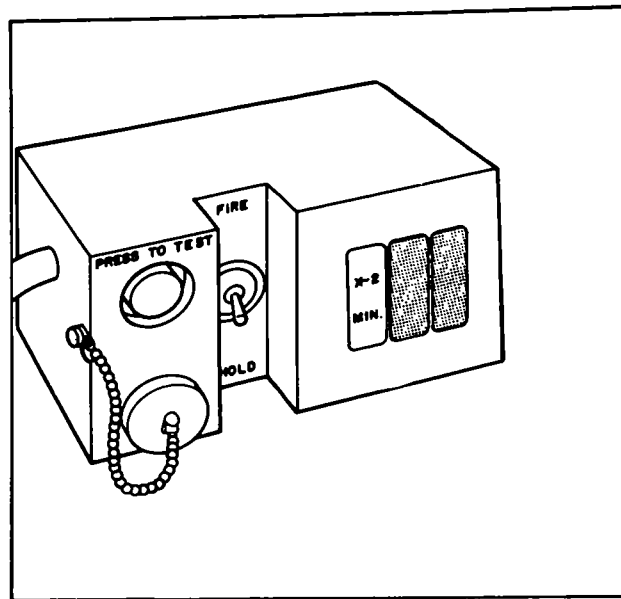
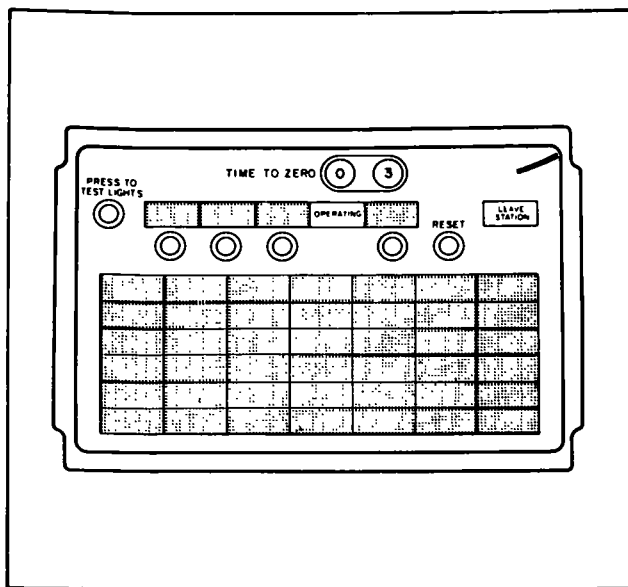


5. REPLACE THE GS ACCESS DOOR.



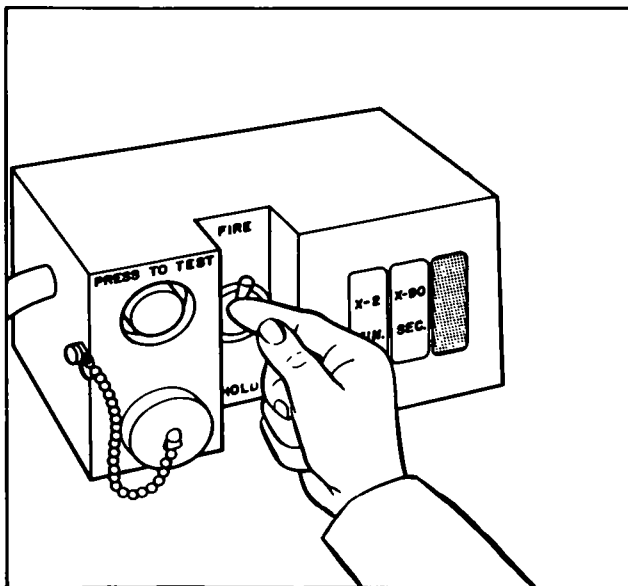
6. LOWER BOTH WORK PLATFORMS.

Figure 18. Operations during countdown prior to X-3 minutes.

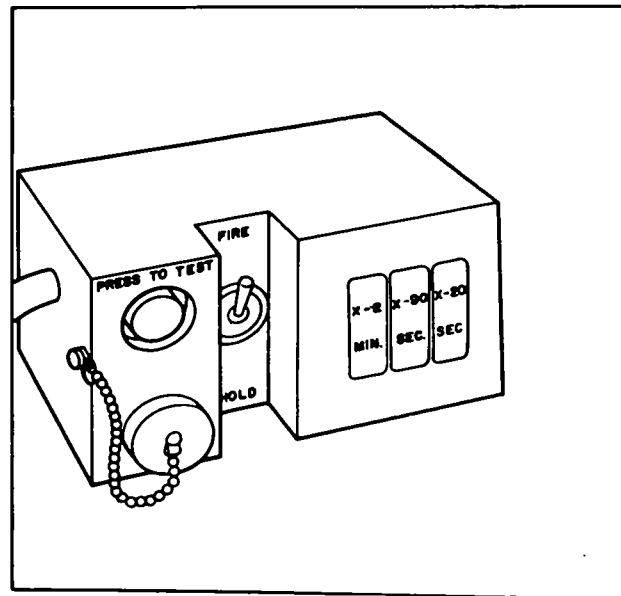


1. AT X-3 MINUTES, THE LEAVE STATION INDICATOR LAMP BEGINS BLINKING. EVACUATE THE FIRING AREA AND PROCEED TO THE REMOTE FIRING POSITION.

2. AT X-2 MINUTES, THE X-2 MIN. LAMP ON THE FIRING BOX STARTS GLOWING.



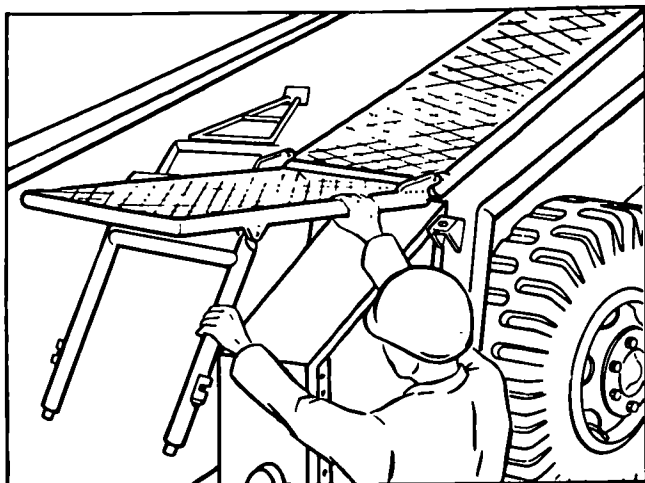
3. UPON COMMAND, PLACE THE FIRE HOLD SWITCH TO THE FIRE POSITION. THE X-90 SEC. LAMP STARTS GLOWING. THE X-2 MIN. LAMP CONTINUES TO GLOW.



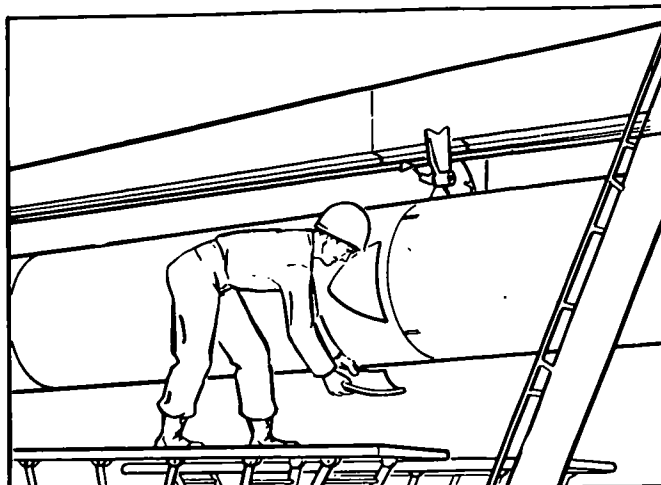
4. AT X-20 SECONDS, THE X-20 SEC. LAMP STARTS GLOWING. THE X-2 MIN. AND X-90 SEC. LAMPS CONTINUE TO GLOW.

NOTE. AT X-0, THE MISSILE WILL FIRE. AS SOON AS THE MISSILE LEAVES THE LAUNCHER, DEPRESS THE SAFE BUTTON ON THE FIRING BOX.

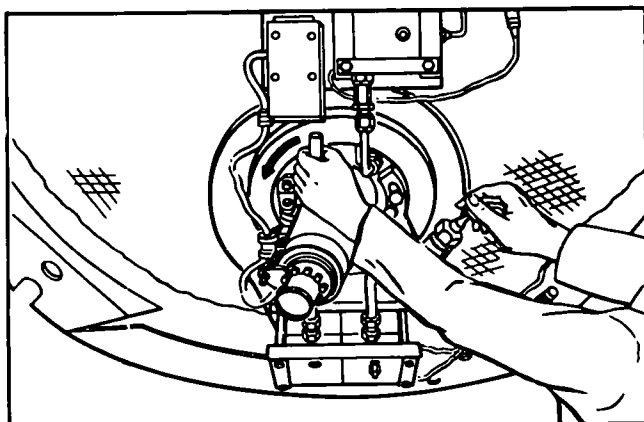
Figure 19. Operations during countdown after X-3 minutes.



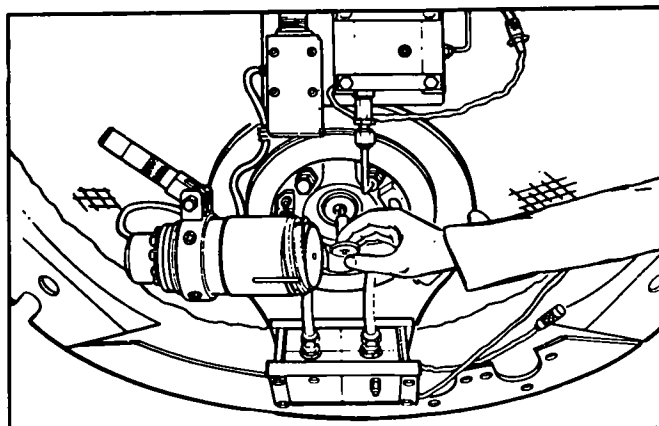
1. RAISE THE WORK PLATFORMS.



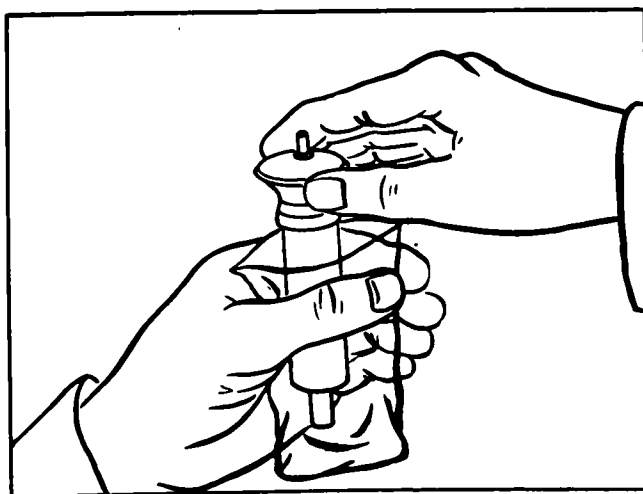
2. REMOVE THE GS ACCESS DOOR.



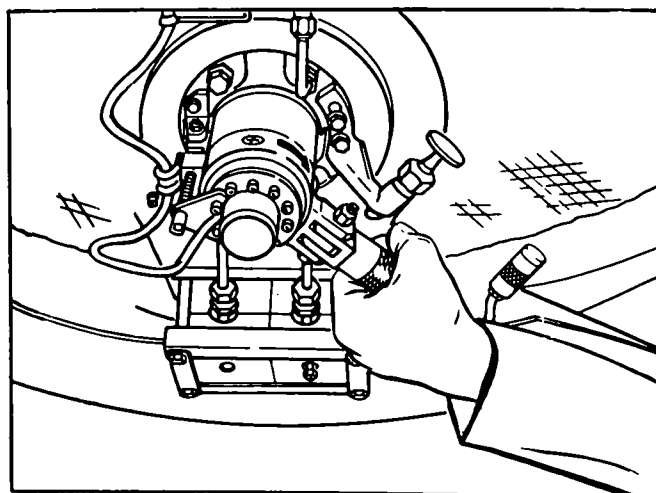
3. PULL UP ON THE BREECH HANDLE LOCK. SWING THE BREECH HANDLE OUTWARD AND ROTATE THE INITIATOR ASSEMBLY COUNTERCLOCKWISE.



4. FOLD BACK THE INITIATOR ASSEMBLY. INSERT THE CARTRIDGE ACTUATING DEVICE INSERTER INTO THE CARTRIDGE ACTUATING DEVICE. PULL OUTWARD ON THE INSERTER TO REMOVE THE CARTRIDGE ACTUATING DEVICE.



5. PLACE THE CARTRIDGE ACTUATING DEVICE IN ITS CONTAINER. THEN PLACE THE CARTRIDGE ACTUATING DEVICE IN THE ROCKET MOTOR CONTAINER.



6. CLOSE THE INITIATOR ASSEMBLY BY ROTATING THE INITIATOR ASSEMBLY CLOCKWISE. SWING THE BREECH HANDLE TOWARD THE MOTOR AND LATCH IT IN PLACE WITH THE BREECH HANDLE LOCK.

Figure 20. Removing the cartridge actuating device from the rocket motor.

porter is positioned and disassembly of the missile is accomplished in accordance with instructions contained in table 4.

d. Once missile disassembly has been completed, march order of the launching station can be accomplished in accordance with instructions contained in table 5.

e. Safety precautions should be stressed in all phases of disassembly, and the missile sections should be packaged in a clean and dry condition for immediate reuse.

Note. Insure that the container cables and inductosyn bar are secure.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE TEST STATION AND MISSILE SECTION TESTS, AND ASSEMBLY REPLACEMENT

17. General

The organizational maintenance test station (OMITS) is a special testing van mounted on a semitrailer (fig. 21, 22, and 23). The organizational maintenance test station is designed to test the missile guidance section and control surface assemblies in their containers. The organizational maintenance test station is also designed to perform a self-test of its electronic assemblies within the van prior to the missile guidance section and control surface assembly tests. This self-test gives greater assurance that the testing equipment is functioning properly when the missile guidance section and the control surface assemblies are tested. The test station is powered by a gas turbine generator set (GTGS). The references used by the missile test section are TM 5-6115-294-12, TM 5-6115-320-12, TM 9-1410-302-20, and TM 9-4935-303-12.

18. Emplacement

Several factors should be considered in choosing a position for emplacing the organizational maintenance test station. The position selected should be on smooth, hard ground to support the test station and provide easy accessibility for the motor guidance transport trailer (MGTT). The maximum slope of this area should not exceed 1 in 10 (100 mils).

a. It is not necessary to uncouple the prime mover from the organizational maintenance test station in order to perform missile guidance section and control surface assembly tests unless high winds are present or expected.

b. If the prime mover is to be uncoupled and the ground is soft or muddy, it will be necessary to place planks or rocks under the OMTS landing gear to keep the van from sinking.

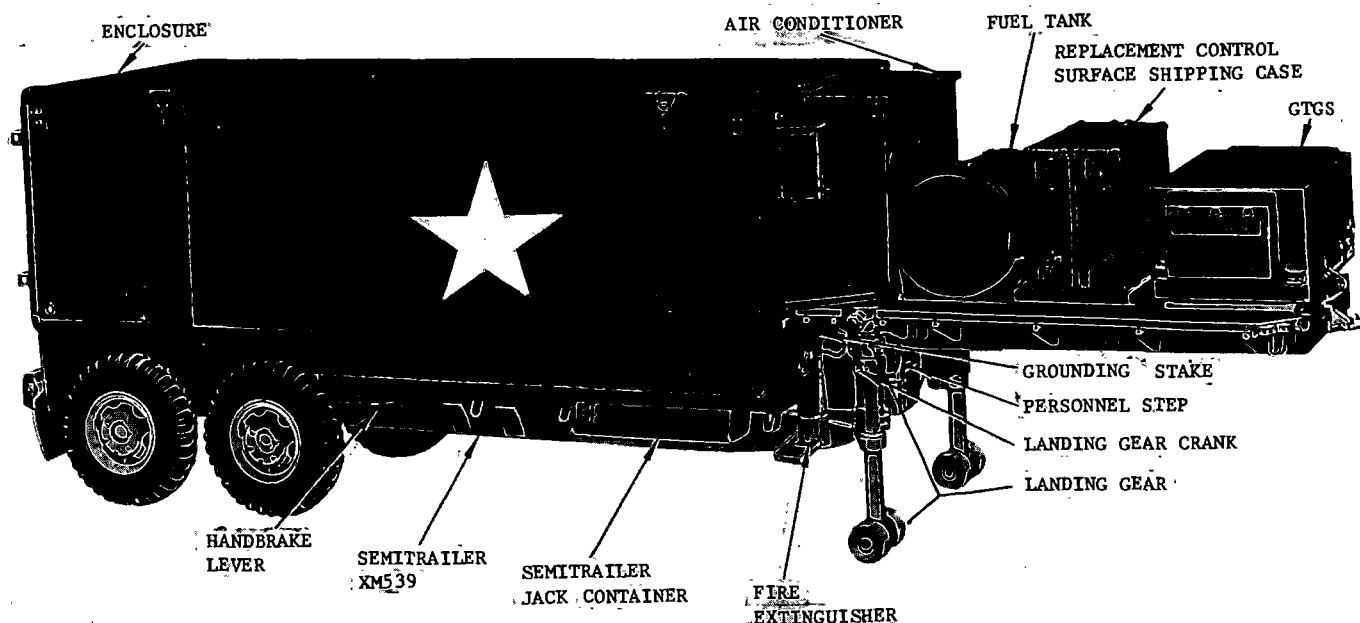


Figure 21. Organizational maintenance test station—right front.

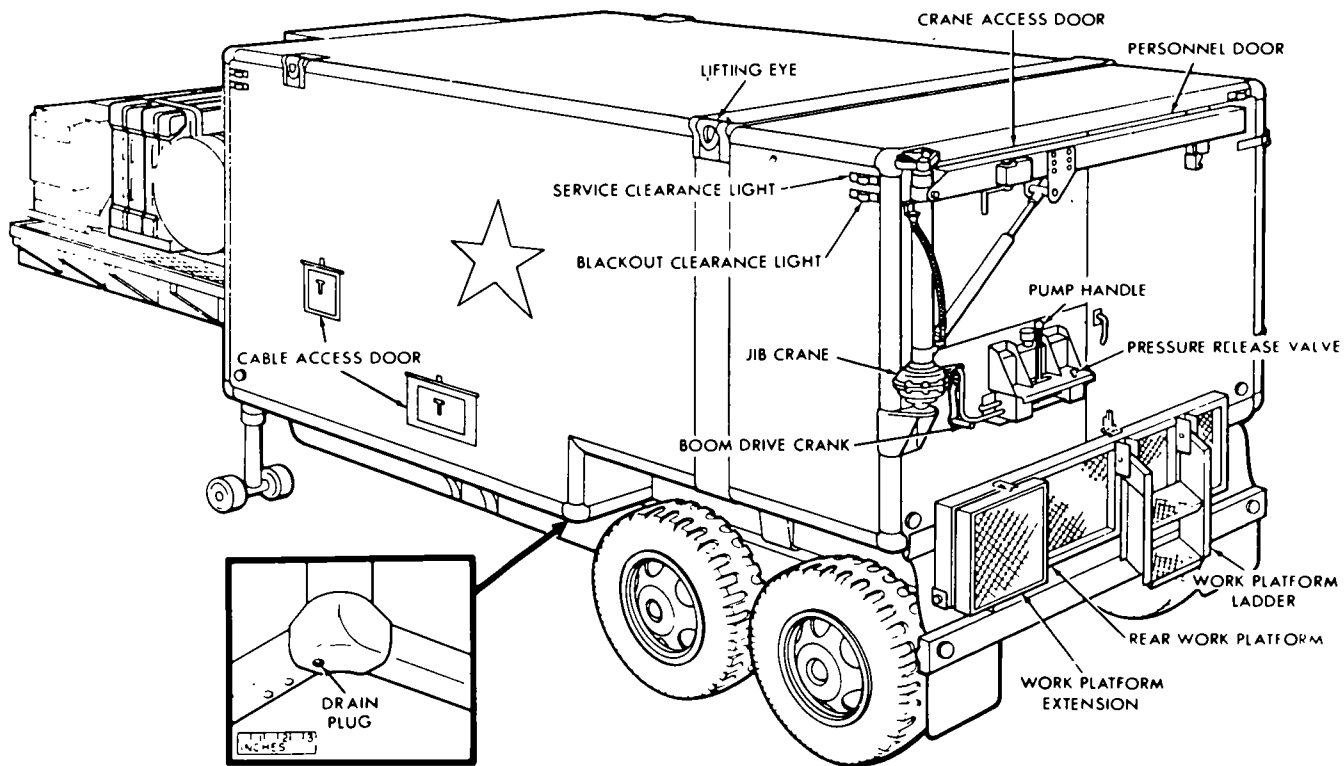


Figure 22. Organizational maintenance test station—left rear.

c. The procedures for emplacing the organizational maintenance test station are illustrated in figures 24 and 25.

19. Operation and Maintenance of the Gas Turbine Generator Set

The gas turbine generator set is mounted on the front of the organizational maintenance test station. The generator set consists of a high-speed gas turbine engine connected to an electrical generator. The operation and maintenance of the gas turbine generator set are covered in TM 5-6115-294-12 and TM 5-6115-220-12.

20. Preparation for Test

a. Position the motor guidance transport trailer to the road side of the OMTS van so that the front of the guidance section container is within 2 feet of the cable access door. Attach the cables to the missile containers as shown in figure 26 and as described in TM 9-4935-303-12. Insure

that the OMTS ground stake is emplaced and that the ground cable is attached.

b. After the gas turbine generator set has been started, check to see that none of the indicators in the upper left corner of the power distribution assembly are illuminated.

21. Self-Test of the Organizational Maintenance Test Station

a. Set the TEST EQUIPMENT POWER switch on the power distribution assembly to the ON position. The TEST EQUIPMENT POWER indicator *must* light. Press the control panel PRESS TO TEST LIGHTS switch and insure that all control panel indicators illuminate. Set the control panel FUNCTION switch to the OMTS position.

b. Press the START button on the control panel. If the FAILURE indicator illuminates, refer to TM 9-4935-303-12 and locate the number displayed in the ASSEMBLY NO. indicator.

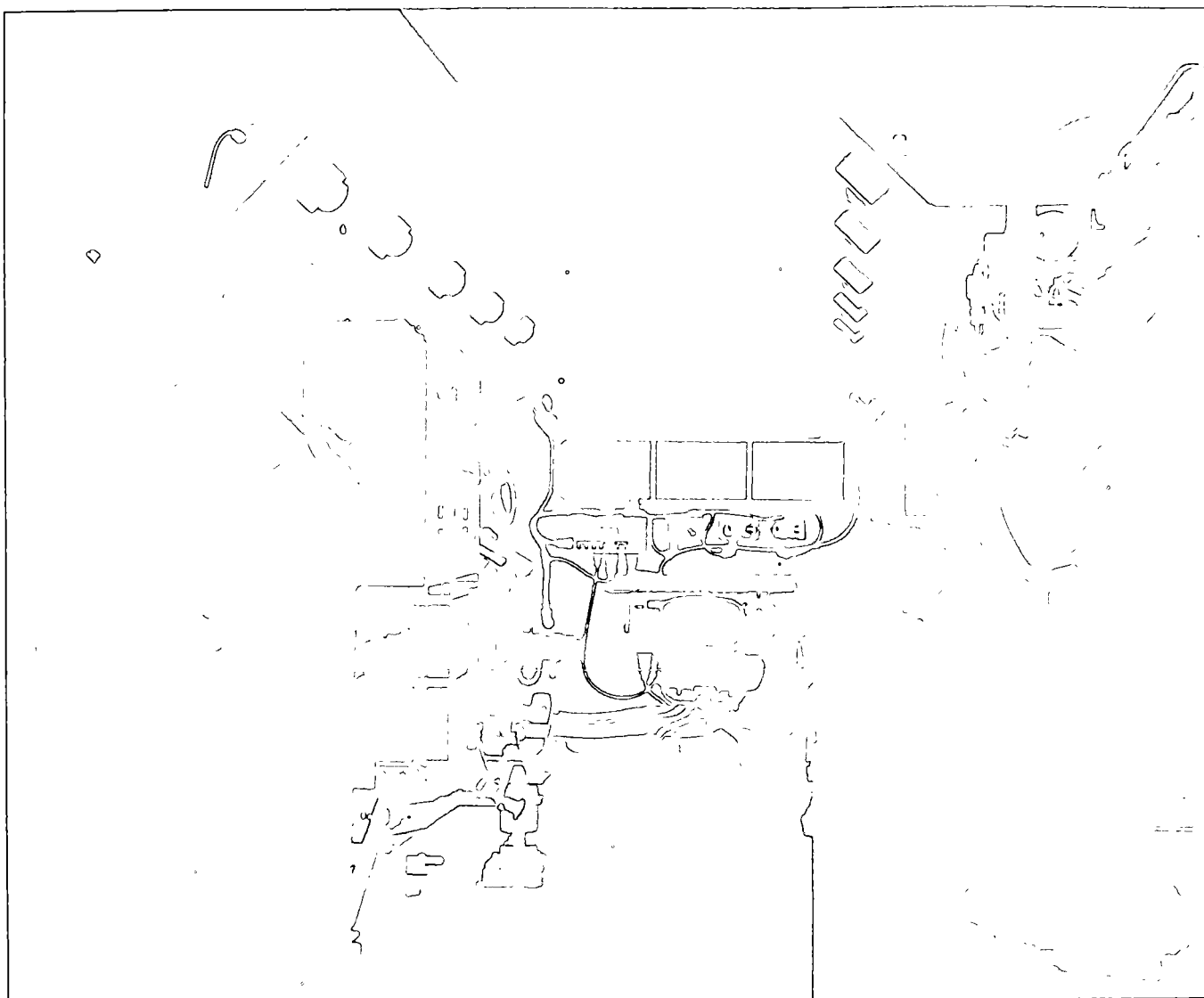


Figure 23. Organizational maintenance test station—interior—looking from the rear.

Perform the troubleshooting steps as outlined in TM 9-4935-303-12. Switch the control panel FUNCTION switch momentarily to the GUIDANCE SECTION position and then back to the OMTS position to reset the stepping switches. Press the START button again to initiate a re-test.

c. Leave the TEST EQUIPMENT POWER switch in the ON position after the COMPLETE indicator lights, unless no further testing is to be performed.

Note. Cables will not be connected while the GUIDANCE READY or FIN READY switch is in the ON position.

d. Certain operations in the test section can be performed simultaneously. While the organizational maintenance test station is going through its self-test, the cables can be connected to the guidance section and the control surface assemblies. The interconnecting diagram for testing the missile sections in their containers (fig. 26) and the procedure for leveling the guidance section container (fig. 27) are included to assist personnel in performing these operations.

22. Guidance Section Test

Before the guidance section can be tested, the section container must be leveled and cabled as illustrated in figures 26 and 27.

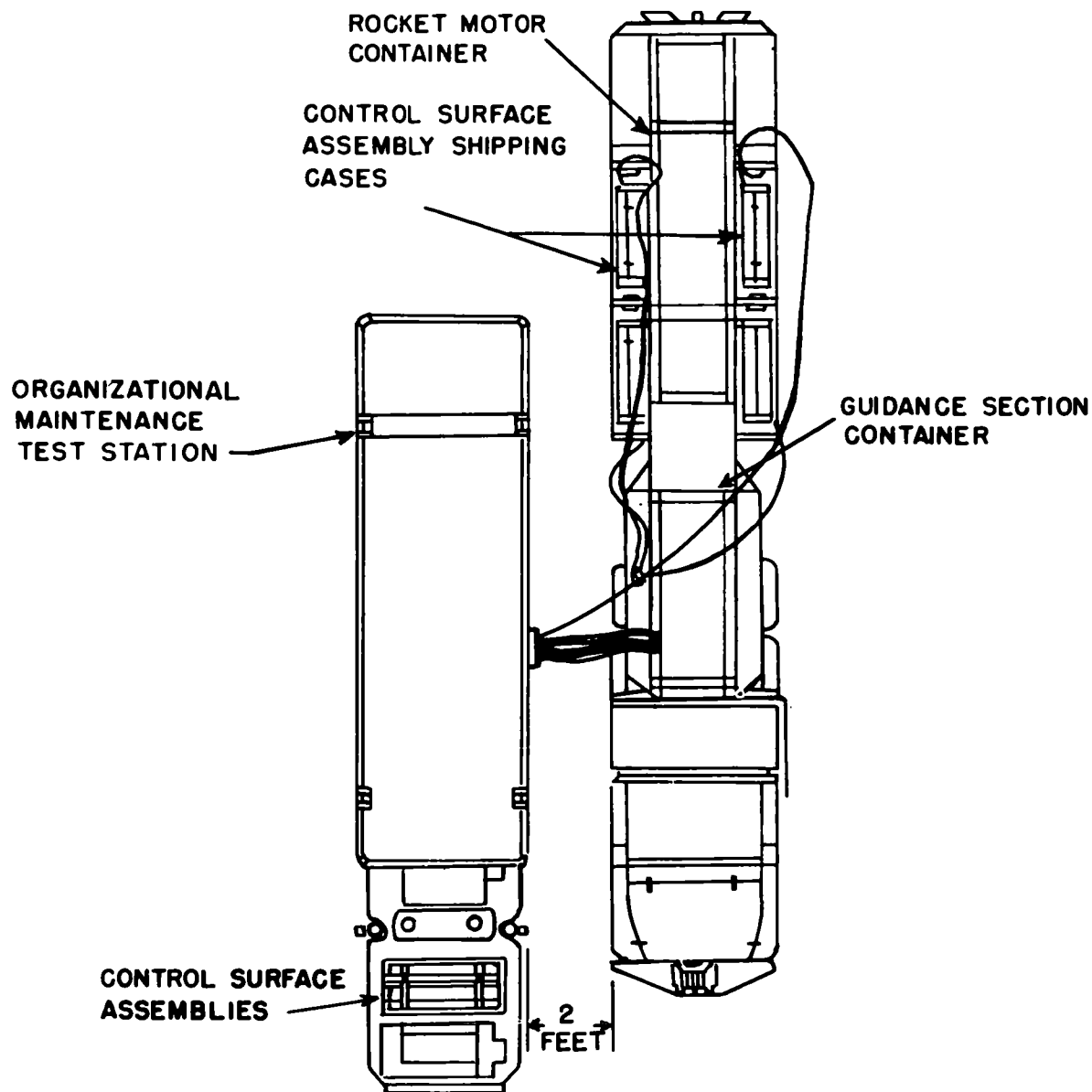


Figure 24. Transporter in position at the organizational maintenance test station.

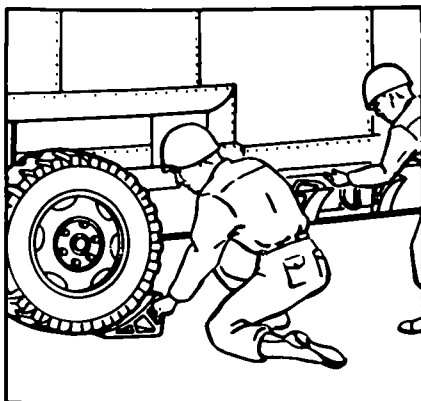
Note. Be sure the container mounting bolts are loose before attempting to level the container.

a. Place the GUIDANCE READY switch on the power distribution assembly to the ON position. The GUIDANCE READY indicator must light. Set the control panel FUNCTION switch to the GUIDANCE SECTION position.

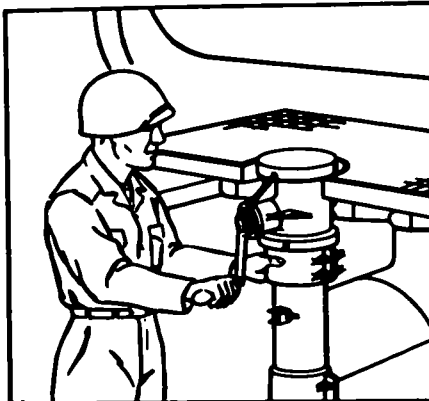
Note. If a self-test has been performed within the past hour and the TEST EQUIPMENT POWER switch has been left in the ON position, another self-test is not necessary.

b. Press the START button on the control

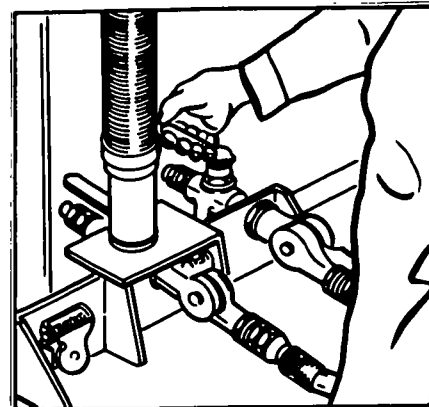
panel. The test will progress automatically. If a failure occurs, refer to TM 9-4935-303-12 for the troubleshooting procedure. Replace any faulty assemblies in accordance with the procedures outlined in TM 9-1410-302-20. After the fault has been corrected, momentarily move the FUNCTION switch on the control panel to the FINS or OMTS position and then back to the GUIDANCE SECTION position (TM 9-4935-303-12). This action is necessary to reset the stepping switches. Press the START button again to initiate a retest.



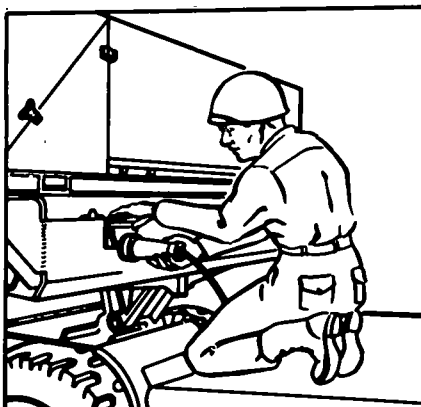
1. SET THE MECHANICAL PARKING BRAKES AND CHOCK THE WHEELS.



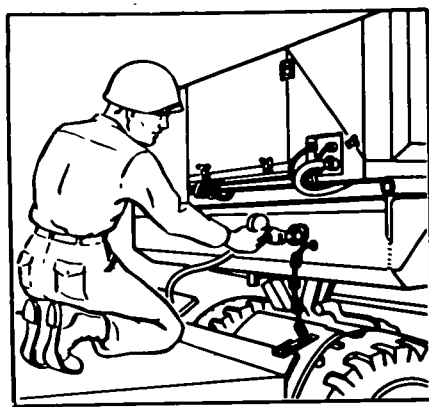
2. LOWER THE LANDING GEAR ON BOTH SIDES OF THE TEST STATION UNTIL THE TEST STATION WEIGHT IS TAKEN OFF THE PRIME MOVER. IF THE GROUND IS SOFT, ADD PLANKS, LOGS OR ROCKS UNDER THE LANDING GEAR TO KEEP THE GEAR FROM SINKING.



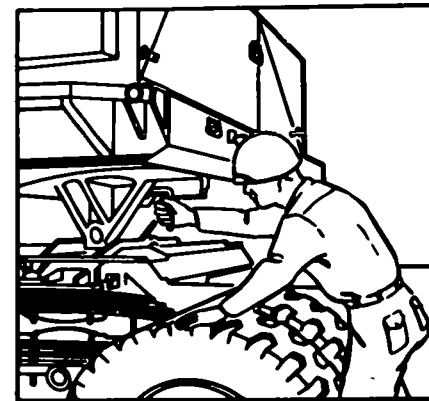
3. ROTATE THE PRIME MOVER AIR VALVES TO THE CLOSED POSITION.



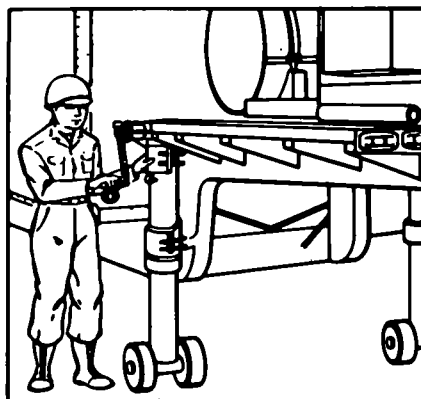
4. DISCONNECT THE PRIME MOVER ELECTRICAL PLUG FROM THE TEST STATION.



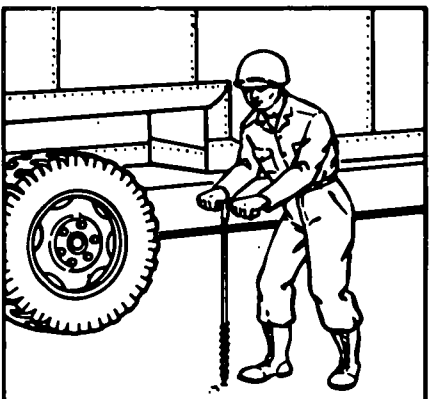
5. DISCONNECT THE TWO PRIME MOVER AIR-BRAKE CONNECTORS. REPLACE THE DUST COVERS ON THE AIR LINES. TO KEEP THE SERVICE BRAKES APPLIED, DO NOT DRAIN THE AIR BRAKE RESERVOIR.



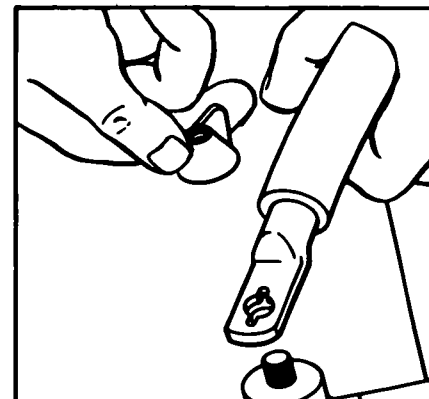
6. MOVE THE FIFTH WHEEL SAFETY LOCK AND PULL THE FIFTH WHEEL RELEASE HANDLE.



7. LEVEL THE TEST STATION LENGTHWISE WITH THE LANDING GEAR. DO NOT ATTEMPT TO LEVEL THE TEST STATION SIDEWAYS WITH THE LANDING GEAR.



8. REMOVE THE GROUNDING STAKE FROM THE OUTSIDE FRONT WALL OF THE ENCLOSURE AND PUSH IT INTO THE GROUND.



9. CONNECT ONE END OF THE GROUNDING CABLE (STORED INSIDE THE ENCLOSURE) TO THE WINGNUT ON THE STAKE AND CONNECT THE OTHER END TO THE WINGNUT ON THE SEMI-TRAILER FRAME NEAR THE LANDING GEAR.

Figure 25. Emplacing the organizational maintenance test station.

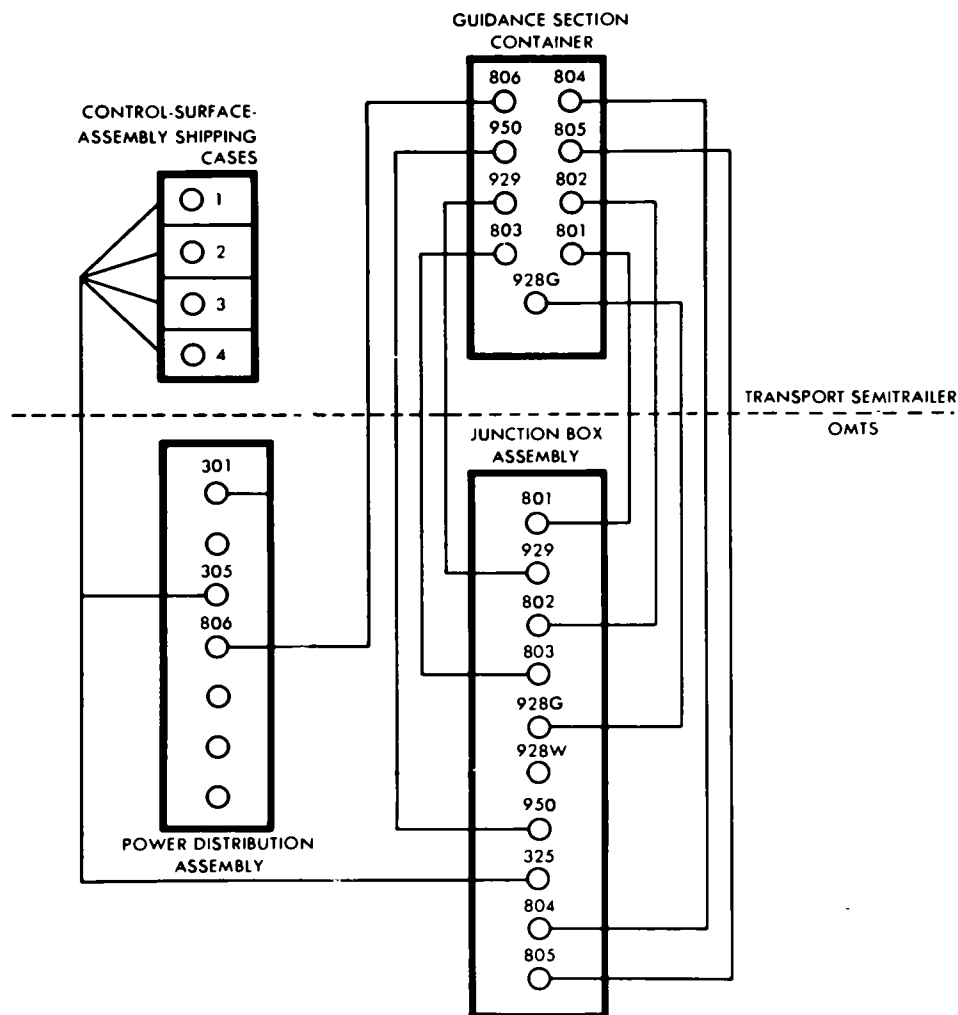


Figure 26. Interconnecting diagram.

c. Place the GUIDANCE READY switch to the OFF position after the COMPLETE indicator on the control panel lights. Leave the TEST EQUIPMENT POWER switch in the ON position unless no further testing is to be performed.

23. Control Surface Assembly Test

The four control surface assemblies are identical and interchangeable. One, two, three, or all four assemblies can be tested at one time. However, if only one assembly is to be tested, the cable marked FLAP 1 must be used; if two assemblies are to be tested, the cables marked FLAP 1 and FLAP 2 must be used; and so on.

a. Place the FIN READY switch to the ON position. The FIN READY indicator must light. Set the FUNCTION switch on the control panel to the FINS position.

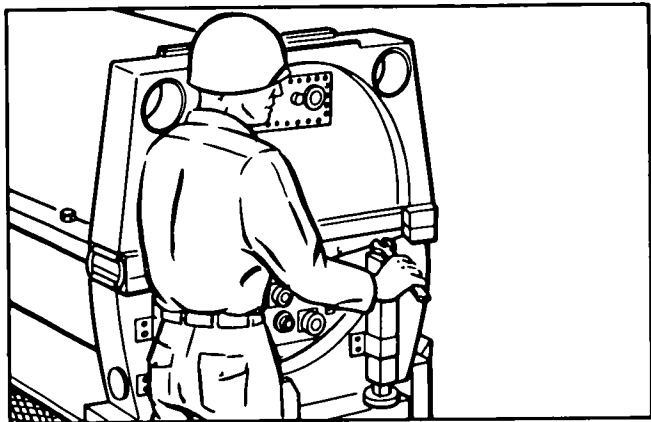
b. Press the START button on the control panel. After the COMPLETE indicator lights, place the FIN READY switch to the OFF position.

c. If a failure occurs during the fins test, refer to TM 9-4935-303-12.

24. Assembly Replacement

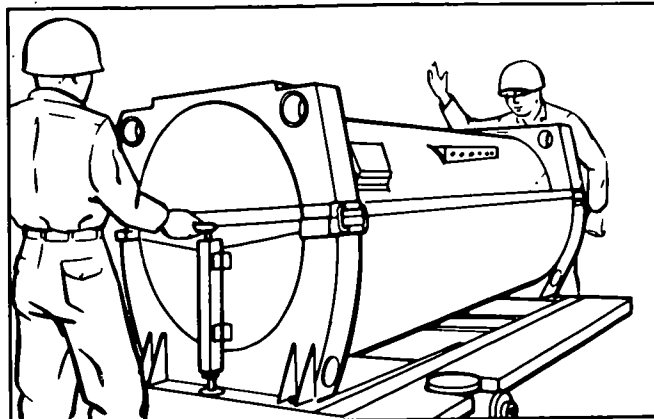
The Sergeant missile system introduced a new concept in corrective maintenance; repair of the missile by field artillery personnel is limited to the replacement of defective assemblies and cables. The replacement of missile sections and control surface assemblies is briefly discussed below.

a. *Rocket Motor.* The rocket motor section cannot be tested by the organizational maintenance test station. Therefore, when any of the following conditions are observed or suspected, the entire

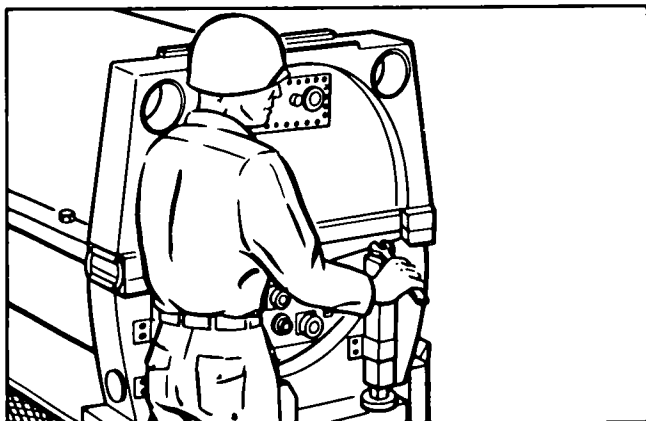
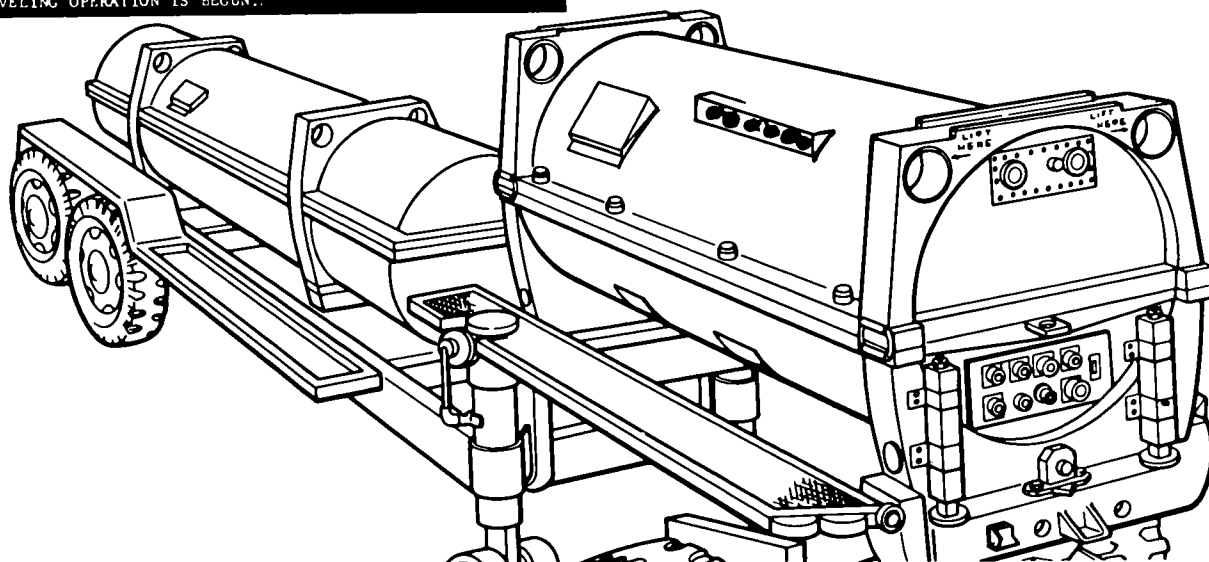


1. TURN THE HEXAGONAL BOLT HEAD ON TOP OF THE LEVELING JACKS IN A CLOCKWISE DIRECTION UNTIL THE JACKS ENGAGE THE JACKPADS ON THE SEMITRAILER FRAME.

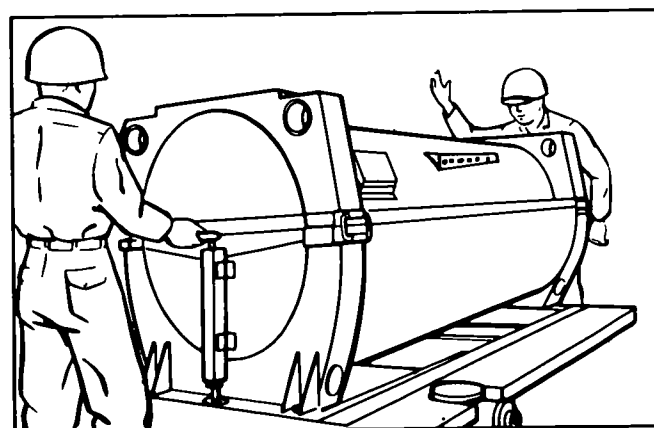
NOTE. THE MONOBALL BEARING ASSEMBLY AND THE ANCHOR BOLT ASSEMBLIES MUST BE DISCONNECTED FROM THE TRAILER FRAME BEFORE THE LEVELING OPERATION IS BEGUN.



2. OPERATE THE REAR LEVELING JACK TO ADJUST THE PITCH OF THE CONTAINER. THE REAR LEVELING JACK OPERATOR RAISES OR LOWERS THE REAR END OF THE CONTAINER ACCORDING TO INSTRUCTIONS FROM THE FORWARD LEVELING JACK OPERATOR, WHO WATCHES THE LEVEL BUBBLE.



3. ADJUST THE ROLL OF THE CONTAINER BY OPERATING THE TWO LEVELING JACKS ON THE FORWARD END OF THE CONTAINER.



4. READJUST THE CONTAINER PITCH BY OPERATING THE REAR LEVELING JACK AS DESCRIBED IN STEP 2 ABOVE.

NOTE. REPEAT STEPS 2, 3, AND 4 UNTIL THE LEVEL BUBBLE IS WITHIN THE CIRCLE.

Figure 27. Leveling the guidance section container.

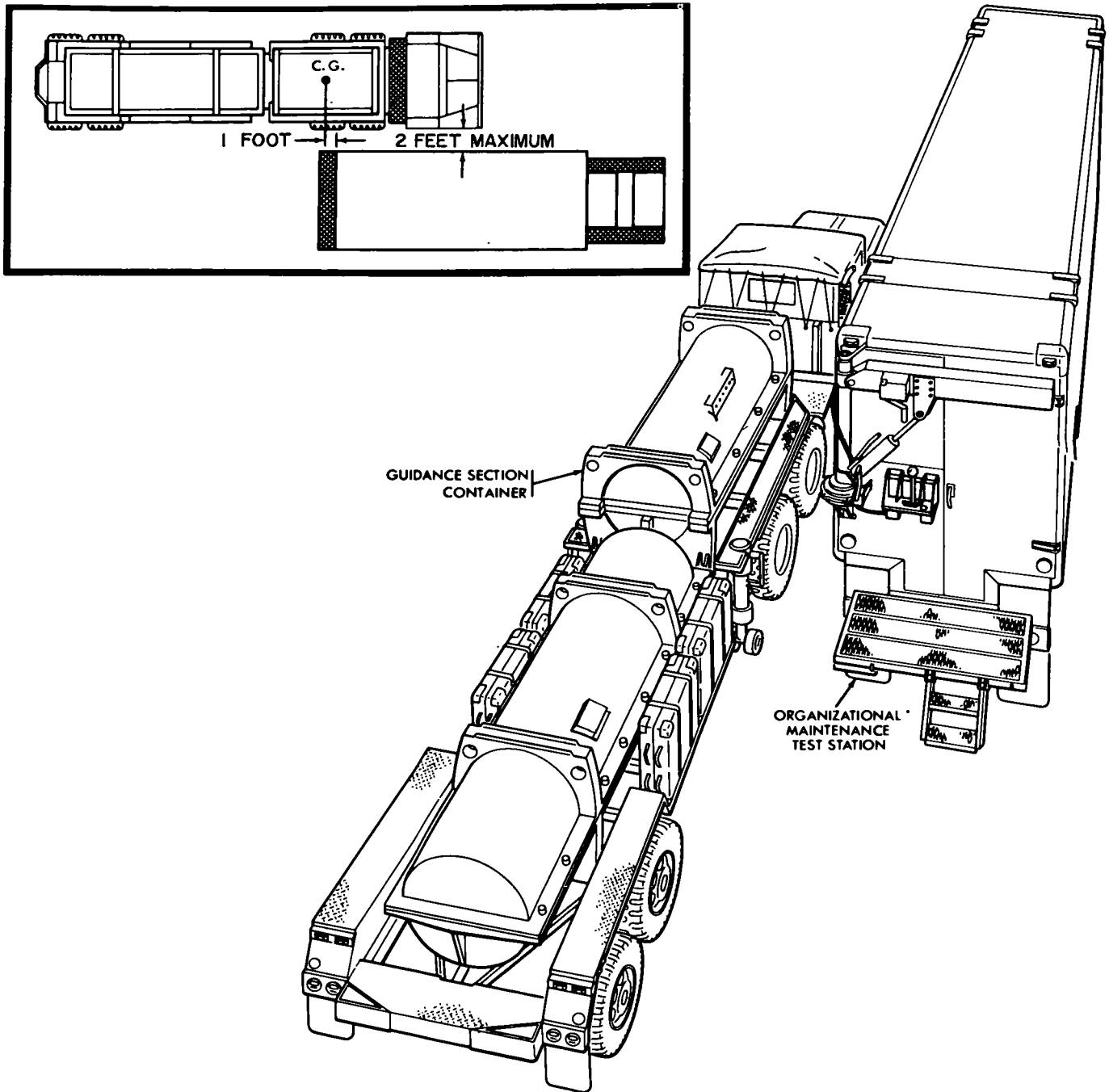


Figure 28. Emplacement of the transporter at the OMTS for removal of the guidance section.

rocket motor section will be returned to the ammunition section for repair or replacement.

(1) Whenever the rocket motor has been dropped or severely bumped, whether in or out of its shipping container.

(2) Whenever a rocket motor is received in a damaged shipping container.

(3) Whenever excessive moisture is indicated by the humidity indicator card on the shipping container.

b. Control Surface Assemblies. If any of the four control surface assemblies are defective, the defective assembly will be replaced with one of the replacement assemblies carried on the organizational maintenance test station. The defective assembly will be returned to the missile maintenance platoon for repair or replacement.

c. Warhead Section. The warhead section cannot be tested at the organizational maintenance test station. For details on maintenance of the warhead section, refer to TM 9-1100-300-12.

d. Guidance Section. If a guidance section assembly is found to be defective during testing with the organizational maintenance test station, the missile test section personnel will replace the defective assembly.

(1) If tactical conditions permit, the guidance computer assembly, the guidance control assembly, or the guidance power supply assembly can be replaced without removing the guidance section from its container.

(2) If the assembly cannot be replaced with the guidance section in its container the following procedure should be used to place the guidance section in the organizational maintenance test station:

(a) Position the motor guidance transport trailer for removal of the guidance section (fig. 28).

(b) Insure that the container mounting bolts are secure before opening the guidance section container.

(c) Open the guidance section container as outlined in TM 9-1410-302-20.

(d) Prepare the guidance section for removal from its container.

(e) Remove the guidance section from its container and install it in the organizational maintenance test station.

(f) Level the guidance section on the leveling jack assemblies.

(3) The missile test station personnel should use TM 9-1410-302-20 and TM 9-4935-303-12 for guidance in replacing defective assemblies in the guidance section.

25. March Order of the Organizational Maintenance Test Station

a. When the command MARCH ORDER is given, the missile test section will prepare the OMTS for travel. The procedure for preparing the OMTS for travel is as follows:

(1) Deenergize the organizational maintenance test station. Secure all equipment inside the van.

(2) Close all ventilator ports against dust and weather.

(3) Clean and cap all cables; then store the cables in their appropriate locations.

(4) Shut down the gas turbine generator set.

(5) Close all doors. Fold the work platform and secure it for travel.

(6) Remove and secure the ground stake. Turn the fuel shut-off valve to the OFF position.

(7) Couple the prime mover to the OMTS semitrailer if it has been uncoupled. Raise the landing gear, release the mechanical brakes, and store the wheel chocks.

b. The chief of the missile test section will inform the firing platoon commander when the organizational maintenance test station is prepared for travel.

CHAPTER 5

SITUATIONS REQUIRING SPECIAL ATTENTION

(STANAG 2314)

26. Holds

a. A command hold may be requested by any individual connected with the firing activities. When the command HOLD is announced, the individual requesting the hold will state the reason for the hold and, if possible, the length of time required before operations can be resumed.

b. The firing platoon commander will investigate the condition that caused the command hold to be announced. He will determine the length of time required for the hold and report the situation to the battery commander or the battalion operations officer.

27. Misfires and Hangfires

a. A *misfire* is a failure of the propellant, igniter, or firing mechanism to function when the firing signal is generated. A *hangfire* is a temporary failure to function; that is, there is an unexpected delay between the time that the firing mechanism operates and the time that the propellant ignites. Since a misfire cannot be immediately distinguished from a hangfire, any failure to fire will be regarded as a hangfire.

b. If the missile does not fire at X-0, the firing set operator will place the firing box FIRE-HOLD switch to the HOLD position at T+5 seconds. All personnel will remain in the designated safety areas for 30 minutes. At the end of the 30-minute waiting period, the firing set operator will push the firing box SAFE button. Two crewmen will enter the firing area and remove the

cartridge actuating device; then the missile will be disassembled in accordance with the instructions contained in TM 9-1440-301-12 and in table 4.

28. Mission Cancellation Procedures

If a mission is canceled after X-14 minutes 30 seconds and the decision is made to disassemble the missile, then the firing set, guidance section, and warhead section must be reset. Refer to TM 9-1440-301-12 for resetting procedures.

29. Warhead Hazard—Indication and Procedure

a. Indication. A failure HOLD indication and WARHEAD HAZARD MISSILE indication on the monitor control panel will indicate that a warhead hazard exists. If a warhead hazard exists, a tone generator in the firing set will generate a warning signal over all hot-loop communications.

b. Procedure.

(1) If a nuclear warhead hazard exists, proceed as indicated in TM 9-1100-300-12.

(2) If a chemical or biological warhead hazard exists, put on protective equipment and clothing, evacuate the area, and notify the unit CBR team and EOD personnel.

Note. Refer to FM 31-45 for duties of personnel involved in an explosive ordnance incident and for the preparation of an explosive ordnance incident report.

CHAPTER 6

MAINTENANCE AND INSPECTION

30. General

a. Maintenance and inspection are essential to insure that the unit is prepared to perform its mission immediately. Systematic maintenance and inspection provide the best insurance against unexpected breakdown at the critical moment when maximum performance is required.

b. Calibration of special weapons test and handling equipment will be accomplished by the supporting special weapons ordnance unit. Calibration of other Sergeant-peculiar equipment will be accomplished by the battalion support maintenance platoon.

31. Procedures for Disassembly, Adjustment and Assembly

The procedures for disassembly, adjustment, and assembly of the firing platoon equipment which are authorized to be performed by battery personnel are prescribed in appropriate technical manuals, as listed in the appendix, and are supplemented by instructions contained in Department of the Army supply manuals. Deviation from these procedures is prohibited unless authorized by the responsible commander.

32. Records

The principal records pertaining to maintenance of Sergeant-peculiar equipment are the missile equipment log and the log books for the ground support equipment; i.e., the launching station equipment log book, the organizational maintenance test station log book, and the gas turbine generator set log books. Complete instructions regarding the procedure for making entries in these records are contained in TM 38-750. The entries must be kept current, and the missile equipment log must accompany the missile at all times until the missile has been fired. The missile equipment log will then be returned through channels for disposition.

33. Maintenance

Periodic inspections and maintenance are performed on all vehicles and equipment both in gar-

ison and combat. The chief of section supervises the daily inspection and maintenance of section equipment. Detailed instructions concerning the maintenance of missile ground support equipment are published in the appropriate technical manuals, as listed in the appendix, and lubrication orders are available for each major item of equipment. Maintenance is a command responsibility and should be so organized that it can be accomplished effectively and rapidly in accordance with the battery SOP and applicable Department of the Army publications.

34. Inspections

Regular inspections are required to insure that equipment is maintained in a combat serviceable condition.

a. Each chief of section is responsible for the equipment within his section. He should make a general inspection each day, and should inspect different items of equipment each day to insure that each item is inspected approximately twice each week. If he sees the need for repair or adjustment, he should immediately notify the platoon or detail commander and the missile assembly technician so that the necessary corrective action may be taken.

b. The platoon or detail commander, accompanied by the chief of section, should make a daily inspection. He should make a thorough mechanical inspection of each major item of equipment as often as necessary. This inspection should include auxiliary equipment, tools, and replacement items.

c. Battery, battalion, and higher commanders should make frequent command inspections to insure that the equipment in their commands is being maintained at the standards required by the battery SOP and applicable Department of the Army publications.

d. Detailed instructions for inspecting the ground support equipment are contained in the appropriate technical manuals listed in the appendix.

e. The duties of individuals for performing the necessary inspections and maintenance of the equipment within each section are assigned by the chief of section and are coordinated and monitored by the missile assembly technician. When the section is reduced in strength, the chief of section must reassign duties to insure that all maintenance is performed.

35. Inspection Before Operation (March)

The inspection before operation is a final check of equipment performed before the unit leaves the motor park for training in the field or the bivouac area, before combat, or before displacement. After the equipment has been inspected and all deficiencies have been corrected, the equipment should be ready for operation.

36. Inspection During Operation (March)

The inspection during operation consists of constant checks on the functioning of the vehicles and the security of all transported equipment.

37. Inspection During the Halt

The inspection during the halt is made at the discretion of the unit commander. The halt provides an opportunity for personnel to inspect for malfunctions that cannot be detected during travel.

38. Inspection and Maintenance After Operation

Immediately after operation, all equipment is serviced, prepared for further sustained operation, and inspected to determine the need for maintenance. These inspections may be performed in the position area by the missile assembly technician and the chief of section.

CHAPTER 7

DECONTAMINATION OF EQUIPMENT

(STANAG 2103)

39. General

a. Operations in a nuclear, biological, or chemical (NBC) environment may result in hazards from either enemy employment or friendly employment of NBC weapons. When the possibility of such hazards arises, personnel must use available protective equipment and employ prescribed defensive measures in order to minimize casualties and insure the accomplishment of the mission. Some defensive measures available to the Sergeant firing battery are as follows:

(1) The use of chemical detection systems, including the deployment of automatic alarms.

(2) The use of protective shelters, paulins, and other available cover to protect materiel against agent contamination.

(3) The use of the protective mask, gloves, and clothing to protect personnel against agent contamination.

(4) First aid for personnel affected by nuclear, biological, or chemical contaminants.

(5) Decontamination of personnel and equipment.

b. Unit defense against the effects of nuclear weapons should include protection against the initial weapon effects (blast, heat, and radiation) and also protection against residual radiation. FM 21-40 contains guidance on unit defenses against nuclear attack.

c. Unit defense against the effects of chemical or biological weapons should include assuming a mission-oriented protective posture as outlined in FM 21-40.

d. Equipment which has been contaminated by chemical, biological, or radiological (CBR) agents must be decontaminated in order to reduce the chance of injury to personnel. Decontamination can be accomplished by covering, removing, or destroying the contaminating material or by changing that material into harmless substances. Personnel involved in CBR decontamination should become familiar with the procedures out-

lined in TM 3-220 and FM 21-40. Each person performing CBR decontamination should wear a field protective mask and normal clothing buttoned at the neck and tied at the wrists and ankles with string (trousers bloused). For added protection, any other protective items that are available may be worn.

Caution: Decontamination should not be performed in an area that will be used for future operations.

40. Chemical Decontamination

The best method for decontamination of equipment is the use of hot air; the next best method is aeration or weathering. Metal parts exposed to blister and V-agents can be decontaminated with DS-2 solution, which is an excellent decontaminant for metal equipment. DS-2 solution is available to the Sergeant firing battery. Electrical devices which contain electron tubes or other heat-producing units are normally decontaminated by the heat given off during operation.

41. Biological Decontamination

A decontaminant for destroying or removing biological contamination should be effective against a variety of biological agents. In addition to natural decontaminants (sunlight, wind, rain, etc) several chemical decontaminants are currently available. Most decontaminants and procedures for chemical decontamination are also effective for biological decontamination. Natural decontamination by rain, wind, or sunlight will destroy most biological agents on the exterior of equipment within a day. Ethylene oxide or carbonide may be used to decontaminate the interior of equipment.

42. Radiological Decontamination

Decontaminants which have good cleansing characteristics normally are used for radiological decontamination, since the contaminants from fallout are usually finely divided articles which ad-

here closely to materials and tend to settle into pores and crevices. In most military situations, radiological contaminants are satisfactorily removed by flushing the contaminated area with water, by the use of steam, and by brushing. The employment of DS-2 solution and use of proce-

dures for chemical decontamination of equipment will also remove most radiological contamination. When speed is not an important factor, aging becomes the most desirable method, since it will make laborious decontamination procedures unnecessary.

CHAPTER 8

DESTRUCTION OF MATERIEL

(STANAG 2113)

43. General

a. Tactical situations may arise in which it is necessary to abandon equipment in a combat zone. In such a situation, it is essential to destroy, to the maximum degree possible, all military technical equipment to prevent its eventual repair and use by the enemy.

b. Destruction of the Sergeant missile system and related materiel will be accomplished when the equipment is subject to possible capture or abandonment in the combat zone. The conditions under which equipment is to be destroyed involve command decisions based on the existing tactical situation. *Equipment will be destroyed only on the authority delegated by a division or higher commander. Usually, such authority will be delegated to the senior military person present in the unit.*

c. Information on the destruction of common materiel, including authority, destruction areas, precautions, methods available, plans, training, and procedures for the destruction of special types of equipment, is presented in FM 5-25. The principles and procedures presented in FM 5-25 also apply to the Sergeant system. Only those items not covered in FM 5-25 will be discussed in this chapter.

44. Conservation of Mobile Units

Major equipment units of the firing battery are housed in or built into mobile vans and special semitrailers that can be quickly readied for evacuation. These units are extremely costly and difficult to replace. Therefore, every effort should be made to evacuate as many of these vans and trailers as possible.

45. Destruction Plans

An adequate, uniform, and easily executed plan will be prepared by each battery to expedite destruction of equipment. The following principles must be considered in developing the destruction plan:

a. Priority must always be given to the destruction of classified materiel. Such destruction must, to the maximum extent possible, prevent duplication of the materiel by the enemy and must deny equipment operational or functional information to the enemy.

b. When complete destruction of abandoned equipment is not possible, priority must be given to destruction of all essential components (including spare parts) of a like kind, in order to render the equipment useless and prevent restoration by cannibalization. Paragraph 47 discusses the order in which parts and components are destroyed.

c. Destruction must be as complete as possible.

d. The same essential parts must be destroyed throughout the battery.

e. Spare parts and accessories must be given the same priority as those installed on equipment.

46. Methods of Destruction

a. Selection of the method of destruction most suited to the Sergeant firing battery depends on the use of materials immediately available. Several methods of destruction are generally available to the battery, and the materials needed for destruction by these methods are readily available in the Sergeant unit. The most generally applicable methods of destruction are mechanical destruction, burning, demolition, and destruction by gunfire.

(1) *Mechanical*—Requires an ax, a pick, a sledge, or similar equipment.

(2) *Burning*—Requires gasoline, oil, incendiary devices, or other flammables.

(3) *Demolition*—Requires ammunition or explosives.

(4) *Gunfire*—Requires artillery, rocket launchers, recoilless rifles, or machine guns.

b. In general, the destruction of essential parts followed by burning of the equipment is sufficient to render the equipment useless.

c. Denial of nuclear, chemical, or biological weapons to the enemy is of paramount importance. The most desirable form of denial is physical removal of the weapon from the threatened area. The next most desirable form of denial (when authorized) is gainful and expeditious employment of the weapon against the enemy. The least desirable form of denial is destruction of the weapon. The battery SOP must specify the conditions under which the weapon is to be evacuated, employed, or destroyed.

47. Priorities for Destruction

Because of the complexity of the Sergeant system, almost every component is vital to its operation. However, certain components are more easily fabricated than others; when lack of personnel and time prevents destruction of all essential components, priorities are given to the destruction of those parts or components most difficult to replace or reproduce. Parts or components are destroyed in the order in which they are listed in *a* through *h* below:

a. *Warhead Section.* The warhead section requires special handling. See TM 9-1100-300-12 for instructions on the destruction of the warhead section.

b. *Classified Technical Manuals.* Classified technical manuals are best destroyed by burning. When time permits, they should be burned page by page to insure complete destruction.

c. *Missile Guidance Section.*

(1) Destruction by demolition is the most effective way of destroying the missile guidance section. If the guidance section is in its container, open the container and remove the section covers. Detonate explosive charges in the drag brake compartment and among the guidance assemblies.

(2) When the use of explosives is not possible, use a heavy object to smash the guidance assemblies and then pour gasoline or another flammable liquid over and into the section. Ignite incendiary grenades inside the guidance assemblies and the drag brake compartment.

d. *Launching Station.* The launching station may be destroyed by burning, demolition, or gunfire.

(1) *Burning.* Use an ax, a pick mattock, a sledge, or another heavy implement to smash all vital parts; then pour gasoline or hydraulic fluid over the entire launching station. Light the fire from a safe distance by using a train of flammable material.

(2) *Demolition.* Smash all vital parts with a heavy implement; then place 6 explosive charges and detonate the charges as follows:

(a) Place the first charge on the turntable.

(b) Place the second charge at the top of the boom support and tape the charge to the hydraulic line where it crosses the trunnion.

(c) Place the third charge inside the firing set and tape it to the electronic assemblies.

(d) Place the fourth and fifth charges between the wheels on each side of the launcher.

(e) Place the sixth charge on the trailer control panel.

(f) Connect the 6 charges together with detonating cord for simultaneous detonation.

(g) Ignite an incendiary grenade under each tire. Then, from a safe distance, detonate the explosives.

(3) *Gunfire.* Use artillery, recoilless rifles, machineguns, rocket launchers with antitank rockets, or tank cannon to destroy the firing set and as much of the frame and superstructure as possible. Gunfire is the most unsatisfactory method of destroying the launching station because the required safe distance separation precludes assurance that destruction is complete.

e. *Rocket Motor.* Destruction of the rocket motor involves destruction of the highly sensitive propellant. Do not attempt to destroy the rocket motor by burning. Wrap detonating cord around the motor case or set up shaped charges to rupture the motor case. For detailed methods of destruction, see TM 9-1410-302-20 and FM 5-25.

f. *Missile Control Surface Assemblies.* Smash the assemblies with a heavy implement or use gunfire to destroy the assemblies.

g. *Cabling.* Use a heavy ax to cut the cabling. Pour gasoline or another flammable liquid over the cabling and set it afire.

h. *Other Equipment.* For other major items of equipment, refer to the pertinent technical manuals listed in the appendix.

Warning: All safety precautions must be exercised in handling demolition explosives and flammable materials. If gasoline is to be used in destruction, consideration must be given to the highly flammable nature of gasoline and of gasoline vapor. Carelessness in the use of gasoline may result in explosions and painful burns. If destruction is to be accomplished with demolition materials, all items to be destroyed must be com-

pletely disconnected from sources of electrical energy and grounded before the explosives, are placed. This will lessen the possibility of injury to

personnel due to contact with high-voltage conductors or from premature detonation of explosives primed for electrical ignition.

CHAPTER 9

SAFETY PRECAUTIONS

48. Purpose and Scope

The purpose of this chapter is to outline the more important safety precautions to be observed by personnel in the Sergeant firing battery. Emphasis is placed on precautions to avoid bodily injury caused by hydraulic pressure or electric shock. Included in this chapter is a summary of first aid treatment for electric shock. Other safety precautions to be observed are prescribed in AR 385-62.

49. Principles

The most important safety principle to be observed in operations involving explosives, toxic (chemical and biological) agents, and fire hazards is to limit the exposure time of a minimum number of personnel to a minimum amount of hazardous material consistent with safe and efficient operation. In keeping with this principle—

- a. Hazardous working areas should be separated from all other areas.
- b. Only the minimum number of personnel needed for efficient operation should be employed in hazardous working areas.
- c. Only the necessary amount of hazardous material should be present in the working area.

Note. For detailed information about nuclear warhead safety, refer to TM 9-1100-300-12.

50. Solid-Propellant Motors

The safety precautions for handling solid-propellant motors do not differ greatly from those for handling artillery ammunition of similar size and weight. Rocket motors must be treated in the same manner that artillery propelling charges are treated. Both are sensitive to friction, flame, and sparks. If improperly handled or stored, propellants may become highly explosive.

- a. A propellant should not be used if it is suspected that it may have been dropped or otherwise severely jarred. A crack in a solid-propellant motor may cause sufficient chamber pressure to result in an explosion when the propellant is ignited.

- b. Personnel working with the propellant must be aware of the safe temperature range for the propellant. Storage temperature must always be within the limits prescribed by TB 9-1410-302-15/1. For additional information, refer to TM 9-1410-302-20.

- c. All propellant igniters will be handled in accordance with the manufacturer's specifications and/or ordnance instructions. Specifically, items that use shorting assemblies will not be disconnected until the igniter has been fixed in the missile and all appropriate precautions have been taken.

- d. Smoking will be prohibited within 100 feet of the launching station and storage areas. Smoking will also be prohibited on any vehicles used in transporting the propellants or explosives. The possession of matches or other flame-producing devices will be prohibited in no-smoking areas.

51. Electric Shock

- a. High voltage is used in the operation of Sergeant-peculiar equipment. Death on contact may result if personnel fail to observe safety precautions. In order to minimize the danger of electrocution, the launching station, organizational maintenance test station, and trailer-mounted gas turbine generator sets must be grounded prior to operation by means of grounding rods and grounding cables. Procedures for emplacing grounding rods and grounding cables are given in the appropriate equipment technical manuals.

- b. A brief outline of the steps necessary to begin rescue and first aid for a person suffering from electrical shock is given below. This outline is very general and does not give the details for administering artificial respiration. All personnel should become proficient in first aid before first aid is needed because they will not have time to learn after an accident occurs.

- (1) *Rescue.* Shut off the high-voltage source and ground the circuits. If the high-voltage source cannot be turned off without delay, free the victim from contact with the live conductor. However, avoid direct contact with the live con-

ductor or the victim's body. Use a dry board, dry clothing, or another nonconductor (ax, shovel, rake) to free the victim. An ax with a dry wooden handle may be used to cut the high-voltage wire. Use extreme caution to avoid injury from the resulting electric flash when the wire is cut.

(2) *Symptoms.*

- (a) Normal breathing stops.
- (b) The victim is usually very white or blue.
- (c) The pulse is weak or absent and the victim is unconscious.
- (d) Burns are usually present.
- (e) The victim's body may become rigid or still in a very few minutes. This condition is due to the action of the electricity and is not to be considered rigor mortis.

(3) *Treatment.*

- (a) Start artificial respiration immediately.
- (b) Send for a doctor if assistance is available.
- (c) Do not leave the victim unattended.
- (d) Keep the victim warm to lessen the degree of shock.
- (e) Continue artificial respiration at the scene of the accident unless the life of the victim or life of the person giving artificial respiration is endangered by such action. If it is necessary to move the victim, move him no farther than necessary for safety.

52. Hydraulic Safety

Hydraulic pressure is used in Sergeant-peculiar equipment for many purposes, such as lifting and swinging great weights. The following precautions should be observed by personnel in the area in which hydraulic power is being used:

- a. Personnel must stay clear of a load being lifted. Hydraulic lines may rupture or pumps may fail, and the load could drop suddenly.

- b. Personnel should stand clear of hydraulic lines. A ruptured hydraulic line will spew fluid which can blind or burn.

- c. The slewing or swinging of the boom is accomplished by using hydraulic power, and personnel must remain out of the path of the boom.

53. Battery Electrolyte Safety

At X-20 seconds in the countdown, the primary wet battery assembly is activated. If the mission is aborted after X-20 seconds, electrolyte will spew from the primary wet battery assembly and the assembly will have to be replaced. The electrolyte is concentrated potassium hydroxide and is injurious to the skin and eyes. When removing the activated battery, crewmen should wear protective clothing and guard against touching the electrolyte.

- a. If the electrolyte contacts the skin, the exposed personnel must immediately wash the exposed skin area with cool, clean water. Then they should cover the skin with a mild acetic acid (vinegar) solution, if available. If the acetic acid solution is not available, personnel should continue to gently wash the skin with cool, clean water and should report to the medical aidman as soon as possible.

- b. If the electrolyte gets into the eyes, the exposed personnel must immediately flush the eyes with cool, clean water and continue flushing until medical aid is available. An acetic acid solution must not be used for flushing the eyes.

- c. If electrolyte is both in the eyes and on the skin, the eyes should be decontaminated first.

54. Hearing Protection

The noise made by a gas turbine generator set when it is operating is detrimental to hearing and may cause loss of sensitivity to high frequencies. The noise is especially hazardous to personnel working in the near vicinity of the generator. Such personnel should wear earplugs, aural suppressors, or radio headsets while in the vicinity of an operating gas turbine generator set in order to prevent loss of hearing.

CHAPTER 10

TRAINING

55. Purpose and Scope

The purpose of this chapter is to present the minimum requirements for training the personnel of a firing platoon in the performance of their duties. The training requirements are based only on the material contained in the text of this manual. This chapter includes general information on the conduct of training.

56. Objectives

a. The objectives are to train firing platoon crewmen rapidly in their individual duties and, through drill, to weld them into an effective, coordinated team that is capable of functioning efficiently and quickly in combat. Optimum efficiency is attained through frequent drills.

b. Each member of the firing platoon must know the duties of the other members of the platoon. Platoon personnel must be able to perform efficiently in all positions. This goal is attained by periodically rotating the section personnel during training.

c. The firing platoon must be able to perform the operations prescribed in this manual equally well during daylight and darkness. Night training under blackout conditions must be stressed.

d. Training in CBR operations will be directed toward attaining and maintaining individual and unit capabilities to accomplish assigned missions under conditions of CBR operations. CBR training should include instruction, practical problems, and field exercises.

e. Safety must be emphasized throughout all training sessions.

57. Conduct of Training

a. Training is conducted in accordance with the principles set forth in FM 21-5 and FM 21-6. The goal of training should be the attainment of the standards set forth in AR 611-201 and in Army Training Test (ATT) 6-555. Army Training Program (ATP) 6-555 may be used as a guide for the preparation of training programs and schedules and for the conduct of advanced in-

dividual and unit training. Army Subject Schedule 6-15B10 may be used as a guide for the instructor in the preparation of lesson plans and for scheduling periods of instruction.

b. Individual training is conducted by noncommissioned officers as much as practicable. Officers are responsible for preparing training plans, for conducting unit training, and for supervising and testing individual training.

c. Throughout training, the application of prior instruction to current training must be emphasized.

d. A record of the training received by each individual should be entered on a progress card, which should be maintained by each chief of section for each man in his section. This card should reflect each period of instruction attended by the individual, the tests taken, and remarks pertaining to his progress. Progress cards should be inspected frequently by the battery commander to insure that they are being kept properly and to determine the status of training. *Requiring the chief of section to keep these records emphasizes his responsibility for his section.*

e. The necessity for developing leadership and initiative in noncommissioned officers must be emphasized constantly throughout training.

f. Realistic training is especially important for a guided missile unit. Simulating essential operations must be avoided. Maximum use should be made of mock firings of training missiles to include section drills on—

- (1) Transfer of missile sections to the launching station and assembly of the missile.
- (2) Checkout of the missile sections at the organizational maintenance test station.
- (3) Prefire procedures at the launching station.
- (4) Countdown and firing (mock included).
- (5) Survey with emphasis on speed and accuracy.
- (6) Communications with emphasis on the establishment and operation of wire nets and the

importance of alertness and promptness in decoding incoming messages and encoding outgoing messages.

58. Training Set, Guided Missile System XM68E2

The training set, guided missile system XM68E2, is a simulated tactical missile designed for use by

the Sergeant firing platoon. Controlled malfunctions may be set into the training set in order to exercise the missile test equipment and to train equipment operators in the detection of malfunctions. It is also used by the firing section for training in the conduct of countdowns. One training set XM68E2 is authorized each Sergeant firing battery.

CHAPTER 11

TESTS FOR QUALIFICATION OF MISSILEMEN

59. Purpose and Scope

This chapter describes the tests to be given in the qualification of missilemen. Tests based on these outlines are designed to measure a crewman's knowledge of all major components of the Sergeant missile system and to measure his skill in the operation of selected items of equipment; they do not require a technical background or school training. The purposes of the tests are to—

- a. Determine the relative proficiency of the individual crewman in the performance of duties required of members of the Sergeant firing platoon. The tests are not intended for use in determining the relative proficiency of batteries or higher units.
- b. Serve as an incentive for the individual crewman of the Sergeant firing battery to expand his knowledge of the complete Sergeant missile system, thereby increasing his value to the unit.
- c. Serve as an adjunct to training.

60. Preparation of Tests

The tests will be prepared under the direction of the battalion commander and should reflect the following:

- a. Tests should be standardized so that the difference between the test scores of any two individuals will be a valid measurement of the differences in their skills.
- b. Each crewman is a prospective candidate for qualification as a missileman, and copies of the tests should be available upon his request.

61. Organization of Tests

The qualification tests within each functional area are organized to follow a logical sequence of events. Although it is not mandatory to examine each functional area in the sequence set forth in this manual, the qualification tests within each functional area should be conducted in the sequence in which they are presented in this manual.

62. Administration of Tests

a. Because of differences in equipment, some modification may be necessary for the administration of the tests to some units. Any modification of the tests should be accompanied by a reevaluation of the weighting system.

b. The battery commander is responsible for the testing of personnel within his battery. Generally, the tests will be administered as follows:

(1) An officer, a warrant officer, or an enlisted man who is fully qualified and experienced in the subject covered by the tests will be detailed as the examiner to administer the tests.

(2) Each section of the qualification tests may be administered over a period of time, which should be standardized throughout the battalion.

(3) A single test, once started, will be conducted from start to finish without interruption.

(4) The candidate will receive no unauthorized assistance. Assistants will be furnished to the candidate as required for each test. If a candidate fails any test because of the examiner or any assistant, the test will be disregarded and the candidate will be given another test of the same nature.

(5) Time limits are not prescribed for the tests because of the varying effects of weather and terrain on the tests. However, the examiner should make appropriate cuts when the candidate requires an excessive amount of time to complete a portion of a test. Before the administration of the test, the responsible officer must decide what constitutes excessive time according to the conditions existing at that time.

(6) The examiner will explain to the candidate the scope of the test and will designate the men who will act as the candidate's assistants. When the test has been completed, the examiner will critique the candidate's performance and report the tentative score to the battery commander. The battery commander will compute the final score and forward the test score to the battalion S3.

c. In those tests in which a candidate is required to direct or supervise assistants, he will do so in a manner commensurate with the position of authority occupied by him during the test.

63. Qualification Scores

A total maximum score of 100 points is possible on completion of all the tests. The points required

for qualification of expert missileman, first-class missileman, and second-class missileman are as follows:

<i>Individual classification</i>	<i>Points</i>
Expert missileman	90-100
First-class missileman	80-89
Second-class missileman	70-79

64. Outline of Tests

Paragraph	Functional area	Subject	Number of tests	Points each	Maximum credit
65	Missile	Positioning of the MGTT	1	3	3
66		Guidance section container opening and closing procedures	1	3	3
67	AOS	Emplacement of the reference theodolite and traverse target	1	3	3
68		Orientation of the reference theodolite	1	3	3
69		Emplacement of the azimuth orientation unit	1	5	5
70		Operation of the reference theodolite	1	3	3
71		Operation of the azimuth orientation unit	1	5	5
72	Launching station.	Nomenclature of the launching station	1	3	3
73		Preoperational checks of the launching station	1	5	5
74		Leveling of the launching station	1	3	3
75		Preparation for the load test	1	3	3
76		Missile assembly	3	5	15
77	Firing set	Nomenclature of the firing set	1	3	3
78		Preoperational checks of the firing set	1	3	3
79		Self-test of the firing set	1	3	3
80		Insertion and computation of a fire mission	1	5	5
81		Conduct of the countdown	1	5	5
82	OMTS	Nomenclature of the OMTS	1	3	3
83		Preoperational checks of the OMTS	1	3	3
84		Self-test of the OMTS	1	3	3
85		Cabling of the OMTS to the guidance section and control surface assemblies	1	5	5
86		Guidance section and control surface assembly tests	1	5	5
87	GTGS	Nomenclature of the GTGS and fuel system	1	3	3
88		Operation of the GTGS	1	5	5
TOTALS			26	--	100

65. Positioning of the MGTT

a. *Scope of Test.* One test will be conducted in which the candidate will be required to direct the positioning of the motor guidance transport trailer alongside the launching station.

b. *Special Instructions.*

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover. The motor guidance transport trailer coupled to its prime mover will be positioned approximately 75 meters from the launching station.

(2) One assistant will be designated to drive the motor guidance transport trailer as directed by the candidate. The assistant will be a qualified

driver and will be familiar with the hand signals described in FM 21-60.

c. *Outline of Test.*

Examiner commands—	Action of Candidate
POSITION THE MOTOR GUIDANCE TRANSPORT TRAILER.	Directs the driver of the prime mover to move the MGTT to the desired position, as shown in figure 2. After the MGTT has been positioned, insures that the engine has been turned off, the vehicle is in gear, the brakes are set, and the wheels are chocked.

d. Penalties. Cuts will be made as follows:

(1) For excessive clearance between the semitrailer and the launching station jack pad, cut 1 point.

(2) For excessive clearance between the prime mover and the launching station platform, cut 1 point.

(3) For failure to aline the transport semitrailer rear axle with the launching station outrigger jack, cut 1 point.

(4) For failure to—

(a) Insure that the engine has been turned off, cut ¼ point.

(b) Insure that the vehicle is in gear, cut ¼ point.

(c) Insure that the brakes are set, cut ¼ point.

(d) Insure that the wheels are chocked, cut ¼ point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

66. Guidance Section Container Opening and Closing Procedures

a. Scope of Test. One test will be conducted in which the candidate will be required to demonstrate the opening and closing procedures for the missile guidance section container.

b. Special Instructions. One assistant will be designated to assist the candidate in opening and closing the guidance section container.

c. Outline of Test.

Examiner commands—	Action of Candidate
OPEN THE GUIDANCE SECTION CONTAINER.	Opens the guidance section container as prescribed in TM 9-1440-301-12.
CLOSE THE GUIDANCE SECTION CONTAINER.	Closes the guidance section container as prescribed in TM 9-1440-301-12.

d. Penalties. Cuts will be made as follows:

(1) For failure to open the inlet breather valve, cut 1 point.

(2) For failure to secure the lid fully open, cut 1 point.

(3) For failure to lock the lid of the guidance section container after closing, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

67. Emplacement of the Reference Theodolite and Traverse Target

a. Scope of Test. One test will be conducted in which the candidate will be required to set up, emplace, plumb, and level the reference theodolite and traverse target and to orient the traverse target with respect to the reference theodolite.

b. Special Instructions.

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover.

(2) Two stakes will be driven into the ground to mark the emplacement sites for the reference theodolite and traverse target. One stake will be designated the primary reference stake, and the other stake will be designated the secondary reference stake. Each stake will be at least 35 meters from the other stake and from the launching station.

(3) One reference theodolite group, one traverse target group, and two tripods in their containers will be available to the candidate.

c. Outline of Test.

Examiner commands—	Action of Candidate
EMPLACE THE REFERENCE THEODOLITE.	Removes the tripod from its container. Sets up, emplaces, and levels the tripod over the primary reference stake. Mounts the reference theodolite on the tripod and plumbs the reference theodolite to the stake. Levels the theodolite.
EMPLACE THE TRAVERSE TARGET.	Removes the tripod from its container. Sets up, emplaces, and levels the tripod over the secondary reference stake. Mounts the traverse target on the tripod and plumbs the traverse target to the stake. Orients the traverse target perpendicular to the line of sight of the reference theodolite. Levels the traverse target.

d. Penalties. Cuts will be made as follows:

(1) For failure to level either tripod over its stake after emplacement, cut 1 point.

(2) For failure to correctly mount the reference theodolite or traverse target on its tripod, cut 1 point.

(3) For failure to plumb the reference theodolite or traverse target to its reference stake, cut 1 point.

(4) For failure to orient the traverse target perpendicular to the line of sight of the reference theodolite, cut 1 point.

(5) For failure to level the reference theodolite or the traverse target after plumbing it to its stake, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

68. Orientation of the Reference Theodolite

a. Scope of Test. One test will be conducted in which the candidate will be required to orient the reference theodolite to the azimuth of an orienting line (A_1).

b. Special Instructions. Prior to the start of the test—

(1) The reference theodolite will be emplaced, plumbed, and leveled over its reference stake.

(2) The traverse target will be emplaced, plumbed, and leveled over its reference stake and oriented perpendicular to the line of sight of the reference theodolite.

(3) The traverse target light will be illuminated.

(4) The examiner will assign an arbitrary value to the azimuth of the orienting line (A_1).

c. Outline of Test.

Examiner commands—	Action of Candidate
ORIENT THE REFERENCE THEODOLITE. (The examiner will give the candidate a card on which the predetermined azimuth of the orienting line has been written.)	Verifies the emplacement, plumb, and level of the reference theodolite. Centers the vertical and horizontal crosshairs of the telescope on the traverse target as outlined in TM 9-1440-301-12. Sets the horizontal circle scale and micrometer circle scale of the reference theodolite to the azimuth of the orienting line. Rechecks the plumb and level of the reference theodolite.

d. Penalties. Cuts will be made as follows:

(1) For failure to verify the plumb and level of the reference theodolite, cut $\frac{1}{2}$ point.

(2) For failure to center the vertical or horizontal crosshair on the traverse target, cut 2 points.

(3) For failure to set the horizontal circle scale or micrometer circle scale of the reference theodolite to the predetermined azimuth of the orienting line, cut 1 point.

(4) For failure to recheck the plumb and level of the reference theodolite, cut $\frac{1}{2}$ point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

69. Emplacement of the Azimuth Orientation Unit

a. Scope of Test. One test will be conducted in which the candidate will be required to emplace and level the azimuth orientation unit.

b. Special Instructions. Prior to the start of the test—

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover.

(2) The reference theodolite will be emplaced, plumbed, and leveled over its reference stake.

c. Outline of Test.

Examiner commands—	Action of Candidate
EMPLACE AND LEVEL THE AZIMUTH ORIENTATION UNIT.	Removes the AOU pedestal cover and AOU container cover. Removes the AOU from its container. Emplaces and locks the AOU on the pedestal. Reinstalls the cover on the container. Inspects the AOU for serviceability. Raises the pedestal and locks it in the proper position. Levels the AOU as prescribed in TM 9-1440-310-12.

d. Penalties. Cuts will be made as follows:

(1) For failure to properly emplace and lock the azimuth orientation unit on the pedestal, cut 2 points.

(2) For failure to raise the pedestal and lock it in the proper position, cut 1 point.

(3) For failure to level the azimuth orientation unit as prescribed, cut 1 point.

(4) For each failure to reinstall the cover on the azimuth orientation unit container or to inspect the azimuth orientation unit for serviceability, cut $\frac{1}{2}$ point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

70. Operation of the Reference Theodolite

a. Scope of Test. One test will be conducted in which the candidate will be required to qualify the reference theodolite with the azimuth orientation unit.

b. Special Instructions. Prior to the start of the test—

(1) The reference theodolite will be emplaced, plumbed, and leveled over its reference stake and oriented to a predetermined azimuth of the orienting line (A_1).

(2) The azimuth orientation unit will be removed from its container, mounted on the AOU pedestal, and leveled.

(3) One assistant will be designated to operate the AOU as directed by the candidate.

c. Outline of Test.

Examiner commands—	Action of Candidate
QUALIFY THE REFERENCE THEODOLITE WITH THE AZIMUTH ORIENTATION UNIT.	Instructs the assistant to plunge the AOU theodolite telescope and illuminate the AOU collimation target. Illuminates the reference theodolite collimation target. Centers the vertical crosshair of the reference theodolite on the collimation target of the AOU and reads the horizontal circle scale and micrometer circle scale of the reference theodolite. Records this value on the AOS worksheet as A_2 . Transmits A_2 to the assistant, who records it as A_1 . Instructs the assistant to set A_2 on the horizontal circle scale and micrometer circle scale of the AOU. Rechecks the qualification of the reference theodolite after A_2 has been set on the scales of the AOU.

d. Penalties. Cuts will be made as follows:

(1) For failure to illuminate the reference theodolite collimation target, cut $\frac{1}{2}$ point.

(2) For failure to center the vertical crosshair of the reference theodolite on the collimation target of the AOU cut 2 points.

(3) For failure to properly read and record A_2 , cut 2 points.

(4) For failure to instruct the assistant to set A_3 , cut 1 point.

(5) For failure to recheck the qualification of the reference theodolite after A_3 has been set, cut $\frac{1}{2}$ point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

71. Operation of the Azimuth Orientation Unit

a. Scope of Test. One test will be conducted in which the candidate will be required to determine the azimuth of the launching station centerline (A_m).

b. Special Instructions. Prior the the start of the test—

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover. The GTGS will be placed in operation and electrical power will be applied to the launching station.

(2) The reference theodolite will be emplaced, plumbed, and leveled over its reference stake.

(3) The traverse target will be emplaced, plumbed, and leveled over its reference stake; oriented perpendicular to the line of sight of the reference theodolite; and illuminated.

(4) The examiner will assign an arbitrary value to the azimuth of the orienting line (A_1).

(5) One assistant will be designated to operate the reference theodolite as directed by the candidate.

c. Outline of Test.

Examiner commands—	Action of Candidate
DETERMINE THE AZIMUTH OF THE LAUNCHING STATION CENTERLINE.	Directs the assistant to orient the reference theodolite and qualify the reference theodolite with the AOU. Illuminates the AOU collimation light. Qualifies the AOU with the reference theodolite. Turns off the AOU collimation light and turns on the MOU light. Sights the AOU theodolite telescope on the MOU light and determines A_m . Turns off the MOU light.

d. Penalties. Cuts will be made as follows:

(1) For failure to qualify the AOU with the reference theodolite, cut 2 points.

(2) For failure to correctly determine A_m after proper qualification, cut 2 points.

(3) For each failure to correctly illuminate or turn off the AOU collimation light or the MOU light, cut $\frac{1}{2}$ point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

72. Nomenclature of the Launching Station

a. Scope of Test. One test will be conducted in which the candidate will be required to locate, name, and/or state the purpose of various parts of the launching station.

b. Special Instructions. The nomenclature printed on each part on which the candidate is to be questioned will be covered with masking tape or similar material.

c. Outline of Test.

Examiner commands—	Action of Candidate
LOCATE, NAME, AND/OR STATE THE PURPOSE OF EACH OF THE FOLLOWING PARTS: (The examiner will select 20 parts from the components listed below.) Missile A-frame and all its components. Fifth wheel plate assembly. Leveling manifold, outrigger jacks and arms, and rear leveling jack and frame. Blast shield assembly. Structural ring and turntable assemblies. Boom support assembly and all its components. Boom assembly and all its components. On-equipment-materiel (OEM) tools.	Locates, names, and/or states the purpose of each part designated.

d. Penalties.

(1) Cut $\frac{1}{4}$ point for each failure to locate the specified part for each error in nomenclature or statement of purpose.

(2) If the total penalties exceed 3 points, no credit will be awarded.

e. Credit. Subject to the penalties assessed in *d*

above, credit will be awarded as indicated in paragraph 64.

73. Preoperational Checks of the Launching Station

a. Scope of Test. One test will be conducted in which the candidate will be required to perform prescribed preoperational checks of components of the launching station.

b. Special Instructions. Prior to the start of the test—

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover. The GTGS will be placed in operation and electrical and hydraulic power will be applied to the launching station.

(2) The examiner will prepare for the candidate's use a list of the preoperational checks to be performed. The list will reflect the before-operation inspection procedures outlined in TM 9-1440-301-12 for the following equipment areas:

- (a) Wheel and tire assemblies.
- (b) Braking system.
- (c) Trailer and firing set automotive-electrical systems.
- (d) Overall system.
- (e) Fuel system.
- (f) Electrical systems.
- (g) Hydraulic systems.
- (h) Trailer mechanical components.
- (i) Superstructure mechanical components.

(3) A tire pressure gage and earplugs, aural suppressors, or a headset will be available to the candidate for his use during the test.

c. Outline of test.

Examiner commands—	Action of Candidate
PERFORM THE FOLLOWING PREOPERATIONAL CHECKS OF THE LAUNCHING STATION: (The examiner will give the candidate the prepared list of preoperational checks to be performed.)	Performs the required preoperational checks as prescribed in TM 9-1440-301-12. Indicates the corrective action required for any deficiency.

d. Penalties.

(1) For each failure to locate the item to be inspected, cut $\frac{1}{4}$ point.

(2) For each failure to properly perform the indicated inspection procedure, cut $\frac{1}{4}$ point.

(3) For each failure to indicate the proper corrective action for a deficiency, cut $\frac{1}{4}$ point.

(4) If the total penalties exceed 3 points, no credit will be awarded.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

74. Leveling of the Launching Station

a. Scope of Test. One test will be conducted in which the candidate will be required to level the launching station.

b. Special Instructions.

(1) The launching station will be emplaced in an area of suitable dimensions, uncoupled from the prime mover, and prepared for leveling as outlined in TM 9-1440-301-12. The GTGS will be placed in operation, and electrical and hydraulic power will be applied to the launching station.

(2) Earplugs, aural suppressors, or a headset will be available to the candidate for his use during the test.

c. Outline of Test.

Examiner commands—	Action of Candidate
LEVEL THE LAUNCHING STATION.	Observing the bubble-level assembly, levels the launching station along lateral and longitudinal axes as required for launching station orientation.

d. Penalties. For failure to center either bubble of the bubble-level assembly within one vial graduation, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

75. Preparation for the Load Test

a. Scope of Test. One test will be conducted in which the candidate will be required to prepare the hoisting system for a load test.

b. Special Instructions.

(1) The launching station will be emplaced in an area of suitable dimensions, uncoupled from the prime mover, energized, and leveled. The superstructure will be erected, and the extension boom will be unfolded.

(2) One assistant will be designated to operate the boom assembly as directed by the candidate.

(3) A lift ring, an anchor shackle, a tensiometer, and a sling assembly will be available to the candidate.

(4) Earplugs, aural suppressors, or a headset will be available to the candidate for his use during the test.

c. Outline of Test.

Examiner commands—	Action of Candidate
PREPARE THE LAUNCHING STATION FOR THE LOAD TEST.	Directs the assistant to position the boom over the rear leveling jack and to position the trolley properly on the boom. Inspects the hoist yoke, hoist cable, trolley, and trolley cable for serviceability as prescribed in TM 9-1440-301-12. Installs the lift ring, anchor shackle tensiometer, and sling assembly. Directs the assistant to take up the slack in the hoist cable.

d. Penalties. Cuts will be made as follows:

(1) For each failure to properly inspect the hoist yoke, hoist cable, trolley, or trolley cable, cut $\frac{1}{2}$ point.

(2) For failure to properly install the lift ring, anchor shackle, tensiometer, or sling assembly, cut 2 points.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

76. Missile Assembly

a. Scope of Test. Three tests will be conducted in which the candidate will be required to act as the assistant chief of the firing section, as crewman number 1, and as the boom operator during missile assembly operations.

Note. Three candidates may be examined simultaneously during these tests by the rotation of their assigned duties as follows:

	Candidate 1	Candidate 2	Candidate 3
Test 1	Assistant chief of firing section	Boom operator	Crewman number 1
Test 2	Boom operator	Crewman number 1	Assistant chief of the firing section
Test 3	Crewman number 1	Assistant chief of the firing section	Boom operator

b. Special Instructions. Prior to the start of the test—

(1) The launching station will be emplaced in an area of suitable dimensions, uncoupled from the prime mover, energized, and leveled. The superstructure will be erected, and the extension boom will be unfolded.

(2) The hoisting system will be tested and verified as being serviceable.

(3) The motor guidance transport trailer will be positioned alongside the launching station and readied for missile assembly operations. The warhead section transporter will be positioned a short distance from the launching station and readied for missile assembly operations.

(4) Five assistants will be designated to act as crewmen 2, 3, 4, 5, and 6 to assist with the missile assembly operations as directed by the candidate occupying the position of the assistant chief of the firing section. A sixth assistant will be designated to drive the warhead section transporter as directed by the candidate occupying the position of the assistant chief of the firing section.

c. Outline of Tests.

Examiner commands—	Action of Candidate
<i>Test number 1</i>	
LOAD THE ROCKET MOTOR.	Performs his assigned duties as prescribed in table 3 and in TM 9-1440-301-12.
<i>Test number 2</i>	
LOAD AND MATE THE GUIDANCE SECTION TO THE ROCKET MOTOR.	Performs his assigned duties as prescribed in table 3 and in TM 9-1440-301-12.
<i>Test number 3</i>	
LOAD AND MATE THE WARHEAD SECTION TO THE GUIDANCE SECTION.	Performs his assigned duties as prescribed in table 3 and in TM 9-1440-301-12.

d. Penalties. Cuts will be made as follows:

(1) For each error in procedure that causes or results in a safety hazard, cut 3 points.

(2) For each error in procedure that does not cause or result in a safety hazard, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

77. Nomenclature of the Firing Set

a. Scope of Test. One test will be conducted in which the candidate will be required to locate,

name and/or state the purpose of various parts of the firing set.

b. Special Instructions. The nomenclature printed on each part on which the candidate is to be questioned will be covered with masking tape or similar material.

c. Outline of Test.

Examiner commands—	Action of Candidate
LOCATE, NAME, AND/OR STATE THE PURPOSE OF EACH OF THE FOLLOWING PARTS: (The examiner will select 10 parts from the components listed below.) Firing box, cable, and cable reel. Transfer box and all its controls. Azimuth control box and all its controls. Air-conditioning, lighting, and heating control box and all its controls. Firing set assemblies.	Locates, names, and/or states the purpose of each part designated.

d. Penalties.

(1) Cut 1/2 point for each failure to locate the specified part or for each error in nomenclature or statement of purpose.

(2) If the total penalties exceed 3 points, no credit will be awarded.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

78. Preoperational Checks of the Firing Set

a. Scope of Test. One test will be conducted in which the candidate will be required to perform prescribed preoperational checks of components of the firing set.

b. Special Instructions. Prior to the start of the test—

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover. The GTGS will be placed in operation, and electrical and hydraulic power will be applied to the launching station.

(2) The firing platform and ladder will be lowered and emplaced, and the air-conditioning system will be prepared for operation.

c. Outline of Test.

Examiner commands—	Action of Candidate
PERFORM THE PREOPERATIONAL CHECKS OF THE FIRING SET.	Opens the firing set enclosure. Places the lighting and airconditioning controls to the desired positions. Insures that the electronic assemblies are secure. Connects a handset to one of the jacks on the transfer box. Insures that each switch on the transfer box and azimuth control box is in its proper position. Sets the power selector switch on each firing set power distribution box to the PRE-HEAT position.

d. Penalties. Cuts will be made as follows:

(1) For each failure to properly position the lighting or air-conditioning switches, cut $\frac{1}{4}$ point.

(2) For each failure to insure that an electronic assembly is secure, cut $\frac{1}{4}$ point.

(3) For each failure to properly position a switch on either the transfer box or the azimuth control box, cut 1 point.

(4) For each failure to set a power selector switch on a firing set power distribution box to the PRE-HEAT position, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

79. Self-Test of the Firing Set

a. Scope of Test. One test will be conducted in which the candidate will be required to conduct a complete self-test of the firing set.

b. Special Instructions. Prior to the start of the test—

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover. The GTGS will be placed in operation, and electrical and hydraulic power will be applied to the launching station.

(2) The prescribed preoperational checks of the firing set will be performed, and the firing set power distribution boxes will be readied for operation.

(3) The candidate will be provided a copy of TM 9-1440-301-12 for his use during the test.

c. Outline of Test.

Examiner commands—	Action of Candidate
CONDUCT THE COMPLETE SELF-TEST OF THE FIRING SET.	Sets the power selector switch on each firing set power distribution box to the POWER ON position. Insures that the TEST indicators on the transfer box illuminate. Conducts the self-test of the electronic assemblies, the error test of the computer electronic assemblies, and the auto-test of the computer electronic assemblies for both system A and system B as prescribed in TM 9-1440-301-12.

d. Penalties. Cuts will be made as follows:

(1) For each failure to conduct a test in its proper sequence, cut 1 point.

(2) For each failure to perform the prescribed corrective action for an indicated malfunction, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

80. Insertion and Computation of a Fire Mission

a. Scope of Test. One test will be conducted in which the candidate will be required to insert the input parameters into the firing set computer and to compute the mission problem.

b. Special Instructions. Prior to the start of the test—

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover. The GTGS will be placed in operation, and electrical and hydraulic power will be applied to the launching station.

(2) A complete self-test of the firing set will be performed.

(3) The candidate will be provided a copy of TM 9-1440-301-12 for his use during the test.

(4) The examiner will prepare for the candidate's use a firing data sheet containing all input parameters required by the test, including A_m , R_1 , R_2 , and R_3 .

c. Outline of Test.

Examiner commands—	Action of Candidate
INSERT THE FIRING DATA AND COMPUTE THE FIRE MISSION. (The examiner will give the candidate the prepared firing data sheet.)	Inserts each input parameter into the firing set computer as prescribed in TM 9-1440-301-12. Verifies the correctness of each parameter inserted. Computes the mission problem. Checks the computation of the mission problem. Inserts A_m , R_1 , R_2 , and R_3 into the computer. Obtains output parameters R_1 , R , A , A_v , T_B , and R_u . Records output parameters on the firing data sheet. Enters the R_1 value into the azimuth control box. Insures that the START TEST indicator on the monitor-control assembly is illuminated.

d. Penalties. Cuts will be made as follows:

(1) For each failure to properly insert an input parameter into the firing set computer, cut 1 point.

(2) For each failure to properly record an output parameter on the firing data sheet, cut 1 point.

(3) For each failure to perform a prescribed operation in its correct sequence, cut 1 point.

e. *Credit.* Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

81. Conduct of the Countdown

a. *Scope of Test.* One test will be conducted in which the candidate will be required to conduct a complete countdown with the firing set.

b. *Special Instructions.* Prior to the start of the test—

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover. The GTGS will be placed in operation, and electrical and hydraulic power will be applied to the launching station. A missile will be assembled on the launching station and properly connected for a countdown.

(2) A complete self-test of the firing set will be performed. The firing data will be inserted into the firing set computer, and the fire mission will be computed.

(3) The examiner will prepare for the candidate's use a firing data sheet containing all input and output parameters required by the test.

(4) The candidate will be provided a copy of TM 9-1440-301-12 for his use during the test.

(5) The firing box will be connected to the firing set, tested, and positioned either inside or immediately outside the firing set enclosure as directed by the examiner.

c. Outline of Test.

Examiner commands—	Action of Candidate
CONDUCT THE COUNT-DOWN USING SYSTEM _____. (The examiner will select either system A or system B for the conduct of the count-down. The examiner will give the candidate the prepared firing data sheet.)	Sets the selected system TEST OPERATE switch on the transfer box to the OPERATE position. Insures that the associated OPERATE indicator illuminates. Insures that the START TEST indicator on the monitor-control assembly goes off, that the START PROGRAM indicator illuminates, and that the number 15 appears on the TIME TO ZERO indicators. Insures that the PUMP MOTORS switch on the azimuth control box is on and that the PRESS TO TEST indicator is off. Presses the START PROGRAM button on the monitor-control assembly. Conducts the countdown as prescribed by TM 9-1440-301-12.

d. Penalties.

(1) For any error in procedure which invalidates the countdown, cut all 5 points.

(2) For each error in procedure which does not invalidate the countdown, cut up to 1 point, commensurate with the seriousness of the error.

e. *Credit.* Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

82. Nomenclature of the Organizational Maintenance Test Station

a. *Scope of Test.* One test will be conducted in which the candidate will be required to locate, name and/or state the purpose of various parts of the organizational maintenance test station.

b. Special Instructions. The nomenclature printed on each part on which the candidate is to be questioned will be covered with masking tape or similar material.

c. Outline of Test.

Examiner commands—	Action of Candidate
LOCATE, NAME, AND/OR STATE THE PURPOSE OF EACH OF THE FOLLOWING PARTS: (The examiner will select 10 parts from the components listed below.) Jib crane and all its components and controls. Automatic test assemblies. Leveling jack assemblies. Guidance platform hoist assembly. Guidance platform extractor assembly. Heating and air-conditioning controls. Guidance section handling rings and drag brake bands.	Locates, names, and/or states the purpose of each part designated.

d. Penalties.

(1) Cut $\frac{1}{2}$ point for each failure to locate the specified part or for each error in nomenclature or statement of purpose.

(2) If the total penalties exceed 3 points, no credit will be awarded.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

83. Preoperational Checks of the Organizational Maintenance Test Station

a. Scope of Test. One test will be conducted in which the candidate will be required to perform prescribed preoperational checks of components of the organizational maintenance test station.

b. Special Instructions. Prior to the start of the test—

(1) The organizational maintenance test station will be positioned in an area of suitable dimensions. If required because of weather or terrain, the OMTS will be uncoupled from the prime mover.

(2) The GTGS will be placed in operation, and electrical power will be applied to the organizational maintenance test station.

(3) The air-conditioning system will be placed in operation, and adjusted as desired.

c. Outline of Test.

Examiner commands—	Action of Candidate
PERFORM THE PREOPERATIONAL CHECKS OF THE ORGANIZATIONAL MAINTENANCE TEST STATION.	Tests the power distribution assembly indicator lamps. Insures that the power distribution assembly circuit breakers are on. Sets the TEST EQUIPMENT POWER, GUIDANCE READY, and FIN READY switches to their ON positions and insures that the corresponding indicators illuminate. Sets the GUIDANCE READY and FIN READY switches to their OFF positions. Insures that all control panel indicators illuminate when the control panel PRESS TO TEST LIGHTS switch is pressed. Sets the TEST EQUIPMENT POWER switch to the OFF position.

d. Penalties. For each failure to perform a prescribed operation in its correct sequence, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

84. Self-Test of the Organizational Maintenance Test Station

a. Scope of Test. One test will be conducted in which the candidate will be required to conduct a complete self-test of the organizational maintenance test station.

b. Special Instructions. Prior to the start of the test—

(1) The organizational maintenance test station will be positioned in an area of suitable dimensions. If required because of weather or terrain, the OMTS will be uncoupled from the prime mover.

(2) The GTGS will be placed in operation, and electrical power will be applied to the organizational maintenance test station. The air-conditioning system will be placed in operation and adjusted as desired.

(3) The preoperational checks of the organizational maintenance test station will be performed. The TEST EQUIPMENT POWER

switch will be placed to the ON position, and the time generator and comparator assemblies will be warmed and readied for operation.

(4) The candidate will be provided a copy of TM 9-4935-303-12 for his use during the test.

c. Outline of Test.

Examiner commands—	Action of Candidate
CONDUCT THE SELF-TEST OF THE ORGANIZATIONAL MAINTENANCE TEST STATION.	Insures that the power distribution assembly TEST EQUIPMENT POWER switch is in the ON position and that the indicator is illuminated. Insures that the GUIDANCE READY, FIN READY, and ADD READY switches are each in the OFF position. Sets the control panel FUNCTION SWITCH to OMTS. Presses the START button and conducts the self-test as prescribed in TM 9-4935-303-12.

d. Penalties. Cuts will be made as follows:

(1) For each failure to conduct a test in its proper sequence, cut 1 point.

(2) For each failure to perform the prescribed corrective action for an indicated malfunction, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

85. Cabling of the Organizational Maintenance Test Station to the Guidance Section and Control Surface Assemblies

a. Scope of Test. One test will be conducted in which the candidate will be required to connect the organizational maintenance test station ground cable set to the guidance section container and the control surface shipping cases.

Notes. (1) This test, as written, requires the guidance section and control surface assemblies to be in their containers on the motor guidance transport trailer. The examiner may, at his discretion, direct that the guidance section and control surface assemblies be moved into the organizational maintenance test station. If so, the examiner will modify the test preparation procedures and the test procedures accordingly.

(2) This test, as written, requires the cabling of the OMTS ground cable set to all four control surface assemblies. The examiner may, at his discretion, direct that

fewer than four control surface assemblies be used for the test. If so, the examiner will modify the test and reevaluate the weighting system accordingly.

b. Special Instructions.

(1) The organizational maintenance test station will be positioned in an area of suitable dimensions. If required because of weather or terrain, the OMTS will be uncoupled from the prime mover.

(2) The GTGS will be placed in operation, and electrical power will be applied to the organizational maintenance test station. The air-conditioning system will be placed in operation and adjusted as desired.

(3) The motor guidance transport trailer will be positioned alongside the organizational maintenance test station in preparation for the missile section tests.

(4) One assistant will be designated to pass the ground test cables through the light-concealing boot assembly as directed by the candidate.

c. Outline of Test.

Examiner commands—	Action of Candidate
CONNECT THE GROUND CABLE SET TO THE GUIDANCE SECTION CONTAINER AND THE CONTROL SURFACE ASSEMBLY SHIPPING CASES.	Removes the OMTS ground cable set from the storage box. Unrolls the light-concealing boot assembly and pulls it through the OMTS cable access door. Directs the assistant to pass the ground test cables through the boot assembly. Removes the dust caps from the connectors and connects the ground test cables to the guidance section connectors as prescribed in TM 9-4935-303-12. Removes the dust caps and connects ground test cable 3A400 to the control surface assembly shipping cases as prescribed in TM 9-4935-303-12. Insures that the plugs are connected in the correct order.

d. Penalties. Cuts will be made as follows:

(1) For each failure to properly connect a cable to the guidance section container, cut 1 point.

(2) For each failure to properly connect a plug to the correct control surface assembly shipping case, cut 1/2 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

86. Guidance Section and Control Surface Assembly Tests

a. Scope of Test. One test will be conducted in which the candidate will be required to conduct the guidance section test and the control surface assembly test.

b. Special Instructions.

(1) The organizational maintenance test station will be positioned in an area of suitable dimensions. If required because of weather or terrain, the OMTS will be uncoupled from the prime mover.

(2) The GTGS will be placed in operation, and electrical power will be applied to the organizational maintenance test station. The air-conditioning system will be placed in operation and adjusted as desired.

(3) The preoperational checks and self-test of the organizational maintenance test station will be performed. The TEST EQUIPMENT POWER switch will be placed to the ON position, and the time generator and comparator assemblies will be warmed and readied for operation.

(4) The guidance section will be connected to the organizational maintenance test station and leveled. The control surface assemblies will be connected to the organizational maintenance test station.

Notes. (1) The examiner may, at his discretion, direct that the guidance section be either in its container on the motor guidance transport trailer or within the organizational maintenance test station.

(2) One, two, three, or all four of the control surface assemblies may be connected to the organizational maintenance test station for this test. If fewer than four control surface assemblies are connected, the examiner will insure that the assemblies are properly connected to the ground test cable as prescribed in TM 9-4935-303-12.

c. Outline of Test.

Examiner commands—	Action of Candidate
CONDUCT THE GUIDANCE SECTION TEST.	Sets the GUIDANCE READY switch on the power distribution assembly to the ON position. Insures that the indicator illuminates. Sets the FUNCTION SWITCH on the OMTS control panel to GUIDANCE SECTION. Insures that the

Examiner commands—	Action of Candidate
	GUIDANCE SECTION indicator illuminates. Presses the START switch on the control panel. Conducts the guidance section test as prescribed in TM 9-4935-303-12. On completion of the guidance section test, places the GUIDANCE READY switch to its OFF position.
CONDUCT THE CONTROL SURFACE ASSEMBLY TEST.	Sets the FIN READY switch on the power distribution assembly to the ON position. Insures that the indicator illuminates. Sets the FUNCTION SWITCH on the control panel to FINS. Insures that the FINS indicator illuminates. Presses the START switch on the control panel. Conducts the control surface assembly test as prescribed in TM 9-4935-303-12. On completion of the control surface assembly test, places the FIN READY switch and the TEST EQUIPMENT POWER switch to their OFF positions.

d. Penalties. Cuts will be made as follows:

(1) For each failure to conduct a test in its proper sequence, cut 1 point.

(2) For each failure to perform the prescribed corrective action for an indicated malfunction, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

87. Nomenclature of the Gas Turbine Generator Set and the Fuel System

a. Scope of Test. One test will be conducted in which the candidate will be required to locate, name, and/or state the purpose of various parts of the gas turbine generator set and the fuel system.

b. Special Instructions. The nomenclature printed on each part on which the candidate is to be questioned will be covered with masking tape or similar material.

c. Outline of Test.

Examiner commands—	Action of Candidate
LOCATE, NAME, AND/OR STATE THE PURPOSE OF EACH OF THE FOLLOWING PARTS: (The examiner will select 10 parts from the components listed below.) Fuel tank assembly. Fuel filter, fuel pump package, and main fuel shutoff valve. GTGS exterior to include access doors, air intake doors, and exhaust ports. GTGS control panel and all its controls.	Locates, names, and/or states the purpose of each part designated.

d. Penalties.

(1) Cut $\frac{1}{2}$ point for each failure to locate the specified part or for each error in nomenclature or statement of purpose.

(2) If the total penalties exceed 3 points, no credit will be awarded.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

88. Operation of the Gas Turbine Generator Set

a. Scope of Test. One test will be conducted in which the candidate will be required to start and to stop the gas turbine generator set.

Note. This test, as written, requires the use of the gas turbine generator set mounted on the launching station. The examiner may at his discretion direct that the test be conducted with the gas turbine generator set mounted on the organizational maintenance test station and that the test preparation procedures be modified accordingly.

b. Special Instructions.

(1) The launching station will be emplaced in an area of suitable dimensions and uncoupled from the prime mover.

(2) Sufficient grounding rods will be em-

placed, according to the conditions of the soil, to insure a good electrical ground for the launching station.

(3) The GTGS fuel tank will be at least one-fourth full.

(4) The fire extinguisher will be removed from the trailer frame and placed in front of the firing set.

(5) Earplugs, aural suppressors, or a headset will be available to the candidate for his use while the gas turbine generator set is operating.

c. Outline of Test.

Examiner commands—	Action of Candidate
START THE GAS TURBINE GENERATOR SET.	Prepares the fuel system for operation. Performs preoperational checks as outlined in TM 5-6115-294-12 or TM 5-6115-320-12. Starts the GTGS and checks for proper operation.
STOP THE GAS TURBINE GENERATOR SET.	Places the power selector switch, PUMP MOTORS switch, and TEST OPERATE switch to the proper positions. Stops the GTGS as outlined in TM 9-1440-31-12.

d. Penalties. Cuts will be made as follows:

(1) For failure to properly prepare the fuel system for operation, cut 1 point.

(2) For failure to properly perform preoperational checks, cut 1 point.

(3) For failure to check the GTGS for proper operation after starting, cut 1 point.

(4) For each failure to place the power selector switch, PUMP MOTORS switch, or TEST OPERATE switch in its proper position prior to stopping the gas turbine generator set, cut 1 point.

e. Credit. Subject to the penalties assessed in *d* above, credit will be awarded as indicated in paragraph 64.

APPENDIX

REFERENCES

1. Army Regulations (AR)

50-2	Nuclear Weapon Accident and Incident Control (NAIC).
50-3	Personnel Security Standards for Nuclear Weapon Duty Positions.
190-60	Physical Security Standards for Nuclear Weapons.
220-58	Organization and Training for Chemical, Biological and Radiological (CBR) Operations.
310-1	Military Publications—General Policies.
310-25	Dictionary of United States Army Terms.
310-50	Authorized Abbreviations and Brevity Codes.
380-5	Safeguarding Defense Information.
385-62	Firing Guided Missiles and Heavy Rockets for Training, Target Practice, and Combat.
600-55	Motor Vehicle Driver—Selection, Testing, and Licensing.
611-15	Selection, Assignment, and Retention Criteria for Personnel in Nuclear Reactor Positions, Nuclear Weapons Positions, and Command Control Positions.
611-201	Enlisted Military Occupational Specialties.
672-5-1	Awards.
750-5	Organization, Policies, and Responsibilities for Maintenance Operations.

2. Field Manuals (FM)

3-10	Employment of Chemical and Biological Agents.
(S)3-10A	Employment of Biological Agents (U).
(C)3-10B	Employment of Chemical Agents (U).
5-20	Camouflage.
5-25	Explosives and Demolitions.
6-2	Artillery Survey.
6-10	Field Artillery Communications.
6-20-1	Field Artillery Tactics.
6-20-2	Field Artillery Techniques
(C)6-37	Field Artillery Battalion, Sergeant (U).
6-40	Field Artillery Cannon Gunnery.
(C)6-40-2	Field Artillery Missile Gunnery (U).
(S)6-141-1A	Nonnuclear Employment of Field Artillery Weapon Systems (Biological) (U).
19-30	Physical Security.
21-5	Military Training Management.
21-6	Techniques of Military Instruction.
21-40	Chemical, Biological, Radiological, and Nuclear Defense.
21-41	Soldier's Handbook for Defense Against Chemical and Biological Operations and Nuclear Warfare.
21-48	Chemical, Biological, and Radiological (CBR) and Nuclear Defense Training Exercises.
21-60	Visual Signals.
22-5	Drill and Ceremonies.

24-18	Field Radio Techniques.
24-20	Field Wire and Field Cable Techniques.
31-36(Test)	Night Operations.
31-45	Explosive Ordnance Disposal Service.
101-31-1	Staff Officers' Field Manual: Nuclear Weapons Employment Doctrine and Procedures.
(S)101-31-2	Staff Officers' Field Manual: Nuclear Weapons Employment Effects Data (U).

3. Technical Manuals (TM)

3-220	Chemical, Biological, and Radiological (CBR) Decontamination.
5-236	Surveying Tables and Graphs.
5-241-1	Grids and Grid References.
5-241-2	Universal Transverse Mercator Grid; Zone to Zone Transformation Tables.
5-4120-222-15	*Operator, Organizational, DS, GS, and Depot Maintenance Manual: Air Conditioner; Compact Vertical, 208-V, 3-Phase, 18,000-btuh Cooling, 12,000-btuh Heating (Trane models), 50/60-Cycle.
5-6115-294-12	*Operator and Organizational Maintenance Manual: Generator Set, Gas Turbine Engine: 30-kw, AC, 120/208-V, 3-Phase, 400-Cycle: Skid-Mounted.
5-6115-320-12	*Organizational Maintenance Manual: Generator Set, Gas Turbine Engine: 45-kw, AC, 120/208, 240/416-V, 3-Phase, 4-Wire; Skid-Mounted.
5-6675-205-15	*Organizational, DS, GS, and Depot Maintenance Manual: Theodolite: Directional: 0.002-MIL Graduation: 5.9-in. Long Telescope; Detachable Tribrach w/Accessories and Tripod.
5-6675-207-15	*Operator, Organizational, DS, GS Depot Maintenance Manual: Surveying Instrument, Azimuth: Gyro; Artillery; with Gyroscope Housing, Electronic Null Indicator, and Mounting Base.
5-6675-233-15	*Operator, Organizational, DS, GS, and Depot Maintenance Manual: Theodolite; Directional; 0.002-MIL Graduation; 5.9-in Long Telescope; Detachable Tribrach; w/Accessories and Tripod.
6-230	Logarithmic and Mathematical Tables.
(C)9-1100-300-12	Operator and Organizational Maintenance (Prelaunch Procedures): XM-62E2, XM62E3, XM63E2, and XM63E3 Atomic Warhead Sections; XM138E6 Training Atomic Warhead Section; M65 Practice Atomic Warhead Section (U).
9-1300-206	Care, Handling, Preservation, and Destruction of Ammunition.
9-1400-300-ESC	Equipment Serviceability Criteria for Sergeant Artillery Guided Missile System.
9-1410-302-20	Organizational Maintenance Manual: Sergeant Artillery Guided Missile XM15 (Sergeant Artillery Guided Missile System).
9-1440-301-12	Operator and Organizational Maintenance Manual: Semitrailer Mounted Guided Missile Launching Station, 4-Wheel XM504 (Sergeant Artillery Guided Missile System).
9-2320-211-10	*Operator's Manual: 5-Ton, 6 x 6 Truck, Chassis.
9-2330-300-14	*Operator, Organizational, Direct and General Support Maintenance Manual (including repair parts list) for Chassis, Semitrailer: 6-Ton, 4-Wheel, XM539 and XM539E2.
9-4935-303-12	Operator and Organizational Maintenance Manual: Organizational Maintenance Test Station AN/MSM-35 (Sergeant Artillery Guided Missile System).
38-750	The Army Maintenance Management System (TAMMS).

4. Tables of Organization and Equipment (TOE)

6-556	Headquarters, Headquarters and Service Battery, Field Artillery Battalion, Sergeant.
6-557	Field Artillery Battery, Sergeant.

5. Miscellaneous

DA Pam 108-1	Index of Army Motion Pictures and Related Audio-Visual Aids.
DA Pam 310-Series	Military Publications.
ATP 6-555	Field Artillery Battalion, Sergeant.
ASubjScd 6-15B10	MOS Technical Training and Refresher Training of Sergeant Missile Crewman—MOS 15B10.
ATT 6-555	Field Artillery Battalion, Sergeant.
(C)TB 9-1410-302-15/1	Rocket Motor XM53; Precautionary Requirements for Low Temperature Storage (Sergeant Artillery Guided Missile System) (U).
TF 6-3558	The Sergeant Missile System (22 min).
STANAG 2103	Reporting Nuclear Detonations, Radioactive Fallout, and Biological and Chemical Attacks.
STANAG 2113	Destruction of Military Technical Equipment.
STANAG 2314	Organization and Doctrine for Explosive Ordnance Disposal Operations.

*Refer to DA Pamphlet 310-4 for complete listing of all items covered in this manual.

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By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

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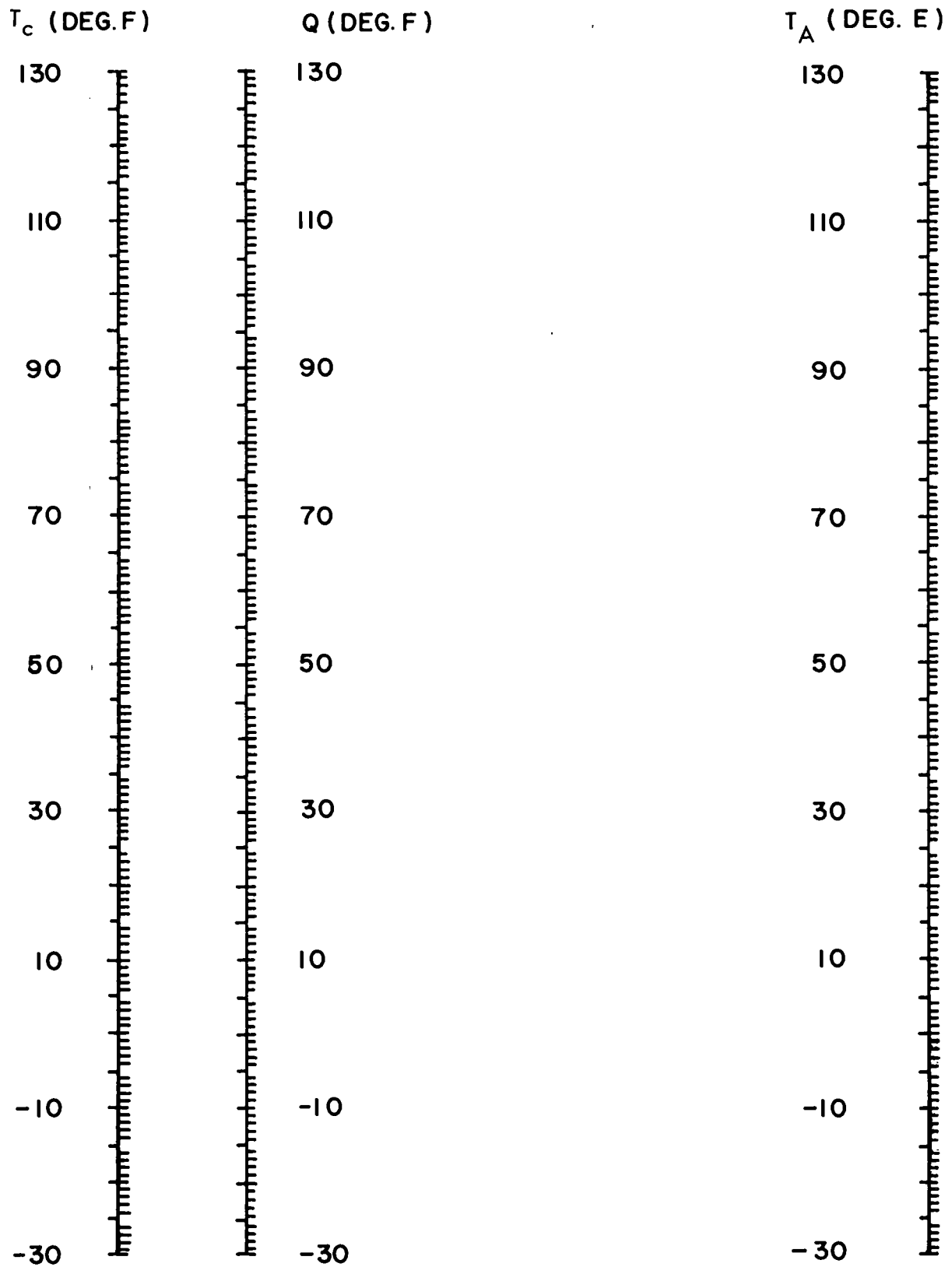


Table 1. Command Holds

COMMAND HOLDS		A	B	C	D
R U L E	IF THE COMMAND HOLD IS CALLED BETWEEN				
1	X-15 MINUTES X-7 1/2 MINUTES	STOPS	X-15 MINUTES	INDEFINITELY	
2	X-7 1/2 MINUTES X-2 MINUTES	STOPS	X-7 1/2 MINUTES		APPROXIMATELY ONCE AN HOUR THE SYSTEM SHOULD BE COUNTED DOWN TO X-3 MINUTES AND RESET TO X-7 1/2 MINUTES
3	X-90 SECONDS X-20 SECONDS	CONTINUES TO X-20 SECONDS AND STOPS	CANNOT BE RESET	UP TO 2 MINUTES	THE TOTAL HOLD FROM X-90 SECONDS TO X-100 MILLISECONDS CANNOT EXCEED 2 MINUTES
4	X-20 SECONDS X-100 MILLISECONDS	CONTINUES TO X-100 MILLISECONDS AND STOPS		UP TO 2 MINUTES	



Table 6. Nomograph for Rocket Motor Q Temperature





2
1
1



1
1
1



Table 2. Duties of Personnel During Emplacement

Chief of section	Assistant chief of section	Crewman number 1	Crewman number 2	Crewman number 3	Crewman number 4	Crewman number 5	Crewman number 6 (heavy truck driver)	Boom operator	Senior azimuth orientating system operator	Azimuth orientating system operator	Firing set operator and assistant firing set operator
						Drives the personnel vehicle to transport the crew into the area.					
Provides the azimuth of the orienting line to the senior azimuth orientating station operator	Directs crewman number 6 (heavy truck driver) in positioning the launching station blast shield over the survey stake.						Drives the launching station prime mover into position.		Obtains the azimuth of the orienting line from the chief of section.		
		Sets the right trailer handbrake.	Sets the left trailer handbrake	Performs the preoperational checks of the fuel system and GTGS as outlined in TM 5-6115-294-12 or TM 5-6115-320-16 and then stands by to start the GTGS.	Assembles the ground stake and, assisted by crewman number 5, drives the stake into the ground and attaches the grounding cable.	Assists crewman number 4 with the ground stake.		Disconnects the forward boom travel lock. Releases the blast shield travel locks.			Turns off the air to the launcher trailer brakes. Uncouples the airhoses and electrical inter-vehicular cable.
	Checks to see that the control valves and switches on the trailer are in their preoperating positions. Receives signals from the boom operator, crewman number 3, and the firing set operator that they have made applicable preoperational checks. Checks to insure that the danger areas for the GTGS are clear.			Signals the assistant chief of section that the preoperational checks of the GTGS have been completed.				Insures that the control valves and switches on the boom are in their normal preoperating positions. Checks the fuel level gauge and fuel tank cap valve. Signals the assistant chief of section that these checks have been completed.			Lowers the firing set platform, opens the door to the firing set, and insures that the firing set power switches are in the OFF positions. Signals the assistant chief of section that this check has been completed.
						Removes the fire extinguisher and stands by with it at the front (panel side) of the GTGS.		Unlocks the rear boom travel lock			Closes the door to the firing set and secures the firing set platform.
	Directs crewman number 3 to start the gas turbine generator set.			Starts the gas turbine generator set when signaled by the assistant chief of section.							
		Checks the hydraulic sumps.									
	Tests trailer control panel lights. Turns on hydraulic pumps and checks the hydraulic pressure and indicator lights.	Removes the right outrigger arm from the travel lock, extends the arm, and locks it in the emplaced position.	Removes the left outrigger arm from the travel lock, extends the arm, and locks it in the emplaced position.	Assists crewman number 1 with the right outrigger.	Assists crewman number 2 with the left outrigger.						
	Places BLAST SHIELD VALVE in the LOCK DOWN position.	Removes the right outrigger jack pad and positions it beneath the outrigger jack.	Removes the left outrigger jack pad and positions it beneath the outrigger jack.		Releases and emplaces the rear jack pad.						
	Extends the outrigger jacks enough to raise the launching station off the fifth wheel of the prime mover.	Cleans the ball end of the jack and engages it with the jack pad.	Cleans the ball end of the jack and engages it with the jack pad.		Cleans the ball end of the rear jack.						Pulls the fifth wheel locking pin.
Directs and signals crewman number 6 when to move the prime mover from the launching station.							Drives the prime mover from beneath the launching station on signal from the chief of section.				
	Extends the rear jack and levels the launching station. Turns off the trailer hydraulic system.				Engages the rear jack with the jack pad.						
								Tests the boom control panel lights			
								Turns on the hydraulic pumps and checks the indicator lights.			
	Signals the boom operator to raise the U-frame to the fully extended position.							Operates the superstructure hydraulic system as directed by the assistant chief of section.			
		Locks the right frame actuator.	Locks the left frame actuator						Emplaces the AOS equipment and installs the necessary communications.	Assists the senior azimuth orientating system operator in emplacing the AOS equipment and installing the necessary communications.	
		Assists crewman number 2 in raising the work platforms and locking them in position.	Assists crewman number 1 in raising the work platforms and locking them in position.								

TABLE 2. EMPLACEMENT

Table 3. Duties of Personnel During Assembly

Chief of section	Assistant chief of section	Crewman number 1	Crewman number 2	Crewman number 3	Crewman number 4	Crewman number 5	Crewman number 6 (Heavy truck driver)	Boom operator	Senior admstr. operating system operator	Admstr. operating system operator	Firing net operator and assistant firing net operator
Supervises assembly. Watches for potential safety violations.						Removes the missile assembly tools from the OEM box and places them on the work platform.			Receives the local data required to initiate ADS operations.	Checks the level of the reference theodolite and the traverse target.	Performs the preoperation and operational checks on the firing net as outlined in TM 9-4440-32-02.
Directs the motor guidance transport trailer into position.	Performs the host cable inspection.							Operates the superstructure hydraulic system during assembly operations as directed by the assistant chief of section.			
				Assisted by crewman number 4, removes the control surface containers from the MGTT.	Assists crewman number 3 in removing the control surface containers from the MGTT.	Assisted by crewman number 5, removes the control surface containers from the MGTT.	Assists crewman number 5 in removing the control surface containers from the MGTT.				
				Assisted by crewman number 4, opens the rocket motor container lid and locks it in place.	Assists crewman number 3 in opening the rocket motor container lid and locking it in place.	Assisted by crewman number 5, opens the control surface container, disconnects the electrical cables, and removes the torque rods from the control surfaces.	Assists crewman number 5 in opening the control surface container, disconnecting the electrical cables, and removing the torque rods from the control surfaces.				
						Assists crewman number 5 in handling the control surface assemblies during missile assembly.	Assists crewman number 5 in handling the control surface assemblies during missile assembly.				
Directs the boom over the rocket motor container. Directs the boom operator to raise the U-frame and lock the U-frame valve in the UP position if the valve is not already there.								Positions the boom over the rocket motor container. Raises the U-frame and locks the U-frame valve in the UP position if the valve is not already there. Returns the lock signal.			
Directs the boom operator to: a. Lower the host.				Assisted by crewman number 4, engages the rocket motor sling with the host yoke.	Assists crewman number 3 in engaging the rocket motor sling with the host yoke.			Operates the superstructure as directed by the assistant chief of section.			
	b. Raise the rocket motor until it clears the container.										
Takes the rocket motor temperature readings and gives them to the firing net operator.				Releases the nozzle plate from the rocket motor.							Receives the rocket motor temperature readings from the chief of section.
	c. Raise the rocket motor until the host yoke is approximately 8 inches from resting in the holder.			Guides the rear end of the rocket motor.	Guides the front end of the rocket motor.						
	d. Set the trolley valve to the IN position until the rocket motor slings are clear of the forward hanger.							Returns the lock signal when the host valve is locked in the UP position.			
	e. Raise the host until it is seated in the trolley and then lock the host valve in the UP position.										
	f. Engage the rocket motor hooks with the boom hanger. Check the HOOKS ENGAGED light for an ENGAGED indication.			Assisted by crewman number 4, opens the guidance section container lid and locks it in the open position. Disconnects the electrical cables (P901 through P906).	Assists crewman number 3 in opening the guidance section container lid and locking it in the open position. Disconnects P902 and P909 from the guidance section.			Returns the OK signal when the LOCKS E.N. GAGED light is illuminated.			
		Verbally directs the boom operator in disengaging the rocket motor slings from the host yoke.	Assists crewman number 1 in disengaging the rocket motor slings from the host yoke.								
		Handles the rocket motor slings to crewman number 5.				Receives the rocket motor slings from crewman number 1. Places the rocket motor slings in the empty rocket motor container and reinserts the nozzle plate to the peg.					
						Assists crewman number 5 in closing the rocket motor container.	Assists crewman number 5 in closing the rocket motor container.	Positions the host valve over the guidance section handling fixture.			
				Engages the host yoke with the guidance section handling fixture.	Assists crewman number 3 in engaging the host yoke with the guidance section handling fixture.						
	Directs the boom operator to: a. Raise the guidance section until it clears the container.							Operates the superstructure as directed by the assistant chief of section.			
	b. Stop the host until crewman number 3 and number 4 have removed the supports.			Removes the guidance section access door and disconnects cable P960. Removes the rear support.	Removes the front support and the plunger level assembly.						
	c. Raise and lock the guidance section 12 to 15 inches from the rocket motor.							Returns the lock signal.			
	d. Position the boom between the work platforms and lock the U-frame in the DOWN position.										
	e. Engage the guidance section with the rocket motor.	Tightens and torques the wing bolts on the side of the guidance section to 1,250 inch-pounds. (850 inch-pounds for training.)	Tightens and torques the wing bolts on the side of the guidance section to 1,250 inch-pounds. (850 inch-pounds for training.)								
		Assisted by crewman number 2, disengages the guidance section handling fixture and removes it to crewman number 5.	Assists crewman number 1 in disengaging the guidance section handling fixture.			Receives the guidance section handling fixture from crewman number 1 and places the fixture in the guidance section container.	Assists crewman number 5 in closing the guidance section container.				
						Assists crewman number 5 in closing the guidance section container.	Assists crewman number 5 in closing the guidance section container.				
						Assists crewman number 5 in closing the control surface container and inserting them to the MGTT.	Assists crewman number 5 in closing the control surface container and inserting them to the MGTT.				
Directs the motor guidance transport trailer from the area.											
Directs the warhead transport vehicle into position.											
				Assisted by crewman number 4, opens the warhead container lid and locks it in the open position. Visually inspects the exposed exterior surface of the warhead.	Assisted by crewman number 3, opens the warhead container lid and locks it in the open position. Visually inspects the exposed exterior surface of the warhead.						
				Disconnects the TWG cable (TWG should already be disconnected) and removes the dust covers.	Disconnects the TWG cable forward and rear tie-down straps.			Positions the U-frame in the UP position and locks the valve of the U-frame in the UP position.			
				Disconnects the green SAFE plug, visually inspects the red FIRE plug and the connector on the warhead, and installs the red FIRE plug.				Seats the trolley host against the forward stop and positions the host valve over the warhead section sling.			
				Engages the host yoke with the warhead sling.	Engages the host yoke with the warhead sling.						
				Releases the two wing bolts from the driver bar. Guides the warhead section off the bar and out of the container. Visually inspects the exposed exterior surface of the warhead.	Visually inspects the exposed exterior surface of the warhead. Inspects and installs the static cable.			Operates the superstructure as directed by the assistant chief of section.			
				Assists crewman number 4 in installing the control surface assemblies, if they have not already been installed.	Assists crewman number 3 in installing the control surface assemblies, if they have not already been installed.			Returns the lock signals.			
		Tightens and torques the side and bottom warhead wing bolts to 1,250 inch-pounds. (850 inch-pounds for training.)	Tightens, then torques the top and side warhead wing bolts to 1,250 inch-pounds. (850 inch-pounds for training.)								
		Assisted by crewman number 2, disengages the warhead sling.	Assisted by crewman number 1, disengages the warhead sling and hands it to crewman number 5.			Receives the warhead sling from crewman number 2.					
		Engages the missile electrical breakaway with the breakaway arm and engages the electrical cables to the connections on the boom, starting with P905 and ending with P906.				Places the warhead sling in the warhead container and straps it down.					
		Assists crewman number 2 in lowering the left work platform and locking it in the travel position.	Assists crewman number 1 in lowering the right work platform and locking it in the travel position.			Assists crewman number 5 in closing the warhead container.	Assists crewman number 5 in closing the warhead container.				
Directs the warhead transport vehicle out of the area.	Rechecks the level and, if necessary, releases the launching station.										
									Inserts the AOU into the missile and makes contact with the induction syn. then plumbs, levels, and inserts the AOU telescope.	Obtains A1 from the senior ADS operator. Signs the reference theodolite on the traverse target and sets A1 on the horizontal scale. Turns the reference theodolite and qualifies it with the AOU.	
									Operates the AOU in conjunction with the reference theodolite to determine R ₁ , R ₂ , and R ₃ in the log book and reports A1 and A ₁ to the firing net operator.	Reciprocally signs the AOU with the reference theodolite. Reports A1 and A ₁ to the senior ADS operator.	
									Turns the AOU to the A parameter and inserts the AOU telescope. Sets R ₂ on the AOU horizontal scale.		
										Signs on the traverse target with the reference theodolite and places a random reading on the horizontal scale (R ₂).	
									Signs the AOU on the reference theodolite and reads R ₃ on the AOU horizontal scale.	Turns and qualifies the reference theodolite with the AOU. Reports R ₃ and R ₃ to the senior ADS operator.	
									Records random readings R ₁ , R ₂ and R ₃ in the logbook and reports them to the firing net operator.	Prepares the reference theodolite for the missile firing.	Receives random readings R ₁ , R ₂ and R ₃ from the senior ADS operator.
									Turns the AOU back to R ₂ .		
									Turns the AOU until R ₂ shows on the AOU scale. When the reading of R ₂ has been completed, sets the AOU READY LIGHT switch to the ON position.		
									Presents the AOU for the missile firing.		
	Checks the insertion of the cartridge securing device.	Inserts the cartridge securing device.									
	Assists crewman number 1 in lowering the right work platform and locking it in the travel position.	Assists the assistant chief of section in lowering the right work platform and locking it in the travel position.									

TABLE 3. ASSEMBLY

Table 4. Duties of Personnel During Disassembly

Chief of section	Assistant chief of section	Crewman number 1	Crewman number 2	Crewman number 3	Crewman number 4	Crewman number 5	Crewman number 6 (Heavy truck driver)	Boom operator	Senior armstruck orienting system operator	Armstruck orienting system operator	Firing set operator and assistant firing set operator
Supervises overall operations.	Directs the senior AOS operator to lower the AOU.	Assists crewman number 2 in ralling the work platforms and locking them in position.	Assists crewman number 1 in ralling the work platforms and locking them in position.	Starts the OTGS if it is not already operating.				Operates the superstructure during the disassembly operations as directed by the assistant chief of section.	Lowest the AOU pedestal.		Performs the shutdown procedures on the firing set as outlined in TM 9-1440-300-12.
	Directs the boom operator to lower the masts from the firing elevation and center them over the work platforms.							Lowest the masts from the firing elevation and center them over the work platforms.	Removes the AOU from its pedestal and returns it to its container.		Insures that the firing set power switches are in the OFF positions.
	Supervises and assists crewman number 1 in re-mov-ing the carriage actuating device.	Opens the guidance section access door, opens the lockstar assembly, and removes the carriage actuating device.									March orders the cable reel assembly (removes firing head) and secures it to the firing set door.
Directs the warhead transport vehicle into position.	Places the carriage actuating device in its plastic container, and then stores the container in a safe location.	Assists the assistant chief of section in placing the carriage actuating device in its plastic container.							Disassembles and secures all AOS equipment.	Assists the senior AOS operator in disassembling and securing all AOS equipment.	Closes all vent doors.
	Insures that both systems of the firing set are reset and that both TEST OPERATE switches are in the TEST position.	Disconnects the six electrical cables from the boom, starting with PB06, and disconnects the breakaway arm.	Disengages the A frame from the missile, if required.			Assists crewman number 6 in removing the control surface containers from the MCTT and opening them.	Assists crewman number 5 in removing the control surface containers from the MCTT and opening them.				
	Directs the boom operator to untold the boom.			Removes the control surface assemblies from the rocket motor.	Assists crewman number 3 in removing the control surface assemblies from the rocket motor.	Replaces the control surface assemblies from the missile, reaches the assemblies, installs the torque rods, and replaces the control surface assemblies in their containers.	Assists in removing the control surface assemblies from the missile, reaches the assemblies, installs the torque rods, and replaces the control surface assemblies in their containers.	Untolds the boom.			Closes the firing set door and takes up and locks the firing set platform in the travel position.
				Assisted by crewman number 4, opens the warhead container and locks it in the open position.	Assists crewman number 3 in opening the warhead container.						
		Receives the warhead sling from crewman number 3.		Hands the warhead sling to crewman number 1.							
	Insures that the warhead sling is secured to the warhead.	Assisted by crewman number 2, secures the warhead sling to the warhead.	Assists crewman number 1 in securing the warhead sling to the warhead.								
	Directs the boom operator to position the trolley over the warhead sling.							Positions the trolley over the warhead sling as directed by the assistant chief of section.			
		Engages the hoist yoke with the warhead sling.									
	Directs the boom operator to lock the boom in the UP position as outlined in (C) TM 9-1100-300-12.	Loosens and disengages the bottom and side warhead swing bolts.	Loosens and disengages the bottom and side warhead swing bolts.					When directed by the assistant chief of section, locks the hoist in the UP position as outlined in (C) TM 9-1100-300-12. Returns the lock signal.			
	Directs the boom operator to: a. Position the trolley against the forward stop in order to disengage the warhead from the guidance section. b. Position the boom and warhead over the warhead container.							Operates the superstructure as directed by the assistant chief of section.			
	c. Lower the warhead until crewman number 3 can place the swing bolts into the engagement slots on the thrust bar of the warhead container and crewman number 4 can remove the rear cable.			Guides the rear of the warhead and positions the swing bolts into the engagement slots on the thrust bar of the warhead container.	Disconnects the static tube and returns it to its container.						
				Removes the red FIRE plug and installs the green SAFE plug.	Disengages the hoist yoke from the warhead sling.						
	d. Seat the hoist into the trolley. e. Center the boom between the work platforms.			Replaces the TWC cable, replaces the dust caps on exposed connectors, and tapes down the swing bolts of the warhead section.							
				Assists crewman number 6 in closing the warhead section container.	Assists crewman number 5 in closing the warhead section container.						
Directs the warhead transport vehicle out of area.											
Directs the motor guidance transport trailer into position.						Assisted by crewman number 5, opens the guidance section container and locks the lid open.	Assists crewman number 6 in opening the guidance section container and locking the lid open.				
	Directs crewman number 1 to disconnect the electrical cables between the guidance section and the rocket motor.	Opens the guidance section access door and disconnects the three electrical cables from the rocket motor.									
		Receives the guidance section handling fixture from crewman number 5 and, assisted by crewman number 2, extracts it to the guidance section.	Assists crewman number 1 in attaching the guidance section handling fixture to the guidance section.			Hands the guidance section handling fixture to crewman number 1.					
	Directs the boom operator to position the trolley over the handling fixture and lower the hoist to engage the handling fixture.	Assisted by crewman number 2, engages the hoist yoke to the guidance section handling fixture.	Assists crewman number 1 in engaging the hoist yoke to the guidance section handling fixture.					Operates the superstructure as directed by the assistant chief of section.			
	Directs the boom operator to lock the hoist in the UP position after the lower guidance section swing bolts have been disengaged.	Loosens and disengages the guidance section swing bolts on the side of the guidance section, starting with the lower bolt.	Loosens and disengages the guidance section swing bolts on the side of the guidance section, starting with the lower bolt.					Locks the hoist in the UP position after the lower guidance section swing bolts have been disengaged.			
	Directs the boom operator to: a. Disengage the guidance section from the rocket motor. b. Lock the U frame in the appropriate position to position the boom over the guidance section container.							Operates the superstructure as directed by the assistant chief of section.			
	c. Lower the guidance section until crewman 3 and 4 can install the supports.					Installs the rear support. Removes the guidance section access door, connects cable PB06 to its connector on the rear support, and removes the access door.	Installs the forward support and the plunger lever assembly.				
	d. Lower the guidance section into the container.					Guides the guidance section into the container.	Guides the front of the guidance section.				
	Insures that the hoist yoke is disengaged from the handling fixture.			Connects PB01 through PB06 to the container. Connects PB06 to the rear support and installs the T-bolt.			Disengages the hoist yoke from the handling fixture.				
	Directs the boom operator to: a. Raise the hoist until it is engaged with the trolley. b. Center the boom over the work platforms. c. Lock the U frame in the appropriate position.			Opens the rocket motor container.	Assists crewman number 3 in opening the rocket motor container.	Assists crewman number 6 in closing the guidance section container.	Assists crewman number 5 in closing the guidance section container.	Operates the superstructure as directed by the assistant chief of section.			
		Receives the rocket motor slings from crewman number 3 and, assisted by crewman number 2, installs the slings.	Assists crewman number 1 in installing the rocket motor slings.	Hands the rocket motor slings to crewman number 1.							
	Verbally directs the boom operator to position the trolley over the rocket motor slings and lower the hoist.							Positions the trolley over the rocket motor slings and lowers the hoist.			
	Insures that the hoist is securely attached to the slings.	Assists crewman number 2 in engaging the rocket motor slings with the hoist yoke.	Assists crewman number 1 in engaging the rocket motor slings with the hoist yoke.								
		Directs the boom operator to lock the hoist to the trolley.						Locks the hoist to the trolley.			
	Directs the boom operator to: a. Position the rocket motor over the container. b. Insure that the U frame is locked in the UP position. c. Disengage the hook latch, etc. and at the same time move the trolley forward approximately 1 foot to disengage the rocket motor from the hoist. d. Lower the rocket motor until the hoist clears the front rocket motor trolley. e. Position the rocket motor over the rocket motor container. f. Lower the rocket motor until crewman number 3 can attach the retaining plates and the nozzle clamp.							Operates the superstructure as directed by the assistant chief of section.			
				Installs the retaining plate and the nozzle clamp.							
	a. Lower the rocket motor into the container.			Guides the rear of the rocket motor into the rocket motor container.	Guides the forward end of the rocket motor into the rocket motor container.						
	Insures that the hoist yoke has been disengaged from the rocket motor slings.			Disengages the hoist yoke from the rocket motor slings.	Assists crewman number 3 in disengaging the hoist yoke from the rocket motor slings.						
	Directs the boom operator to raise the hoist until it is engaged with the trolley.					Insures that the two cartridge actuating devices are installed in their receptacles in the rocket motor container.	Installs the two cartridge actuating devices in their receptacles in the rocket motor container.	Raises the hoist until it is engaged with the trolley.			
						Assists crewman number 6 in closing the rocket motor container.	Assists crewman number 5 in closing the rocket motor container.				
				Returns the control surface containers to the MCTT.	Assists crewman number 3 in opening the control surface containers to the MCTT.	Returns the control surface containers to the MCTT.	Assists crewman number 6 in returning the control surface containers to the MCTT.				
							Replaces the assembly tools in the OEM toolbox.				

TABLE 4. DISASSEMBLY

Table 5. Duties of Personnel During March Order

Chief of section	Assistant chief of section	Crewman number 1	Crewman number 2	Crewman number 3	Crewman number 4	Crewman number 5	Crewman number 6 (heavy truck driver)	Boom operator	Senior azimuth orienting system operator	Azimuth orienting system operator	Firing set operator and assistant firing set operator.
Supervises march order.	Directs crewman number 3 to start the GTGS if it is not already in operation.			On direction from the assistant chief of section, starts the GTGS if it is not already in operation.							Disconnects firing cable from firing box tester and closes tester door. Winds up the firing cable and secures the firing cable reel.
	Directs the boom operator to— a. Move the trolley to the rear stop on the boom. b. Position the boom over the firing set. c. Fold the boom.	Assisted by crewman number 2, insures that the work platforms are locked in the travel position.	Assists crewman number 1 in insuring that the work platforms are locked in the travel position.					Operates the superstructure hydraulic system as directed by the assistant chief of section.	Insures that all AOS equipment is properly stored and locked in the travel position.	Assists the senior AOS operator in disassembling and securing all AOS equipment.	Prepares the firing set for march order as outlined in TM 9-1440-301-12.
	Signals crewmen number 1 and number 2 to unlock the U-frame actuators.	On signal from the assistant chief of section, unlocks the right frame actuator.	On signal from the assistant chief of section, unlocks the left frame actuator.		Insures that all containers are locked in their travel positions on the rear of the launcher.		Drives the launching station prime mover into the area.				
	Directs the boom operator to lower the superstructure to the travel position and to turn off the superstructure pump motors.							Lowers the superstructure to the travel position.			
	Checks the trailer control panel lights.							Turns off the superstructure pump motors.			
	Turns on the semitrailer hydraulic system.							Insures that the controls are in their normal pre-operating positions.			
Directs crewman number 6 to position the prime mover.	Retracts the rear jack to the full-up position. Raises the blast shield.						Positions the launching station prime mover as directed by the chief of section.				
Directs the assistant chief of section to extend the outriggers until the fifth wheel plate can be engaged with the fifth wheel of the prime mover.	Extends the outriggers as directed by the chief of section.				Checks the rear jack travel latch. Locks the rear jack pad in its travel position.			Engages the blast shield travel locks.			
Directs crewman number 6 to engage the launching station fifth wheel pin with the tractor fifth wheel plate.							Engages the fifth wheel pin with the tractor fifth wheel plate.				
Directs the firing set operator to couple the air and electrical cables to the launching station.	Retracts both outrigger jacks to their full-up positions.										Makes all intervehicular cable and airhose connections.
	Turns off the trailer hydraulic system. Signals crewman number 3 to turn off the GTGS.			On signal from the assistant chief of section, turns off the GTGS.							Turns on the air for the launcher trailer brakes.
		Assisted by crewman number 3, returns the right outrigger to its travel position and locks it in place.	Assisted by crewman number 4, returns the left outrigger to its travel position and locks it in place.	Assists crewman number 1 in returning the right outrigger to its travel position and locking it in place.	Assists crewman number 2 in returning the left outrigger to its travel position and locking it in place.						
	Directs crewman number 4 to disconnect the grounding cable from the ground stake.	Secures the right outrigger jack pad in its travel position.	Secures the left outrigger jack pad in its travel position.	Closes the main fuel shut-off valve.	Disconnects the grounding cable from the ground stake. Secures the grounding cable.						
Inspects the launching station to insure that it is secure and that all equipment is accounted for.						Drives the personnel vehicle to the launcher and loads the crew.					

TABLE 5. MARCH ORDER

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